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A Heuristic Method for Scheduling Warehouse
Personnel Under Restrictions of Full Time
And Part Time Requirements

by

Sheryl Adam

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A thesis submitted to the Faculty and the Board of Trustees of the Colorado School of Mines in partial fulfillment of the requirements for the degree of Master of Science (Mathematics).

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ABSTRACT

This thesis originated in a warehousing company in Calgary, Canada. The management of this particular warehouse is interested in scheduling employees so as to exactly fulfill daily requirements. Since the company must pay benefits to all employees it is desirable to fill the workforce with full time employees before part time employees. This constraint implies the problem is a mixed linear integer problem; full time employees are considered integer units and part time employees are considered linear units.

This thesis presents an algorithm that solves this problem without using mixed integer linear programming techniques, which are often unreliable and unstable. The heuristic presented in this thesis is derived in part from Bartholdi, Orlin and Ratliffe's (k, m) -cyclic staffing algorithm and in part from the Browne and Propp's First Period Principle.

The heuristic allows employee scheduling using stable and well tested tools, namely linear programming tools and basic mathematics. In addition a monte carlo analysis of the problem resulted in optimal solutions 97% of the time when the heuristic algorithm was used.

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DEDICATION

My greatest sorrow as I finish this thesis is that my mother is not here to celebrate this accomplishment with me. My mother instilled a love of learning in me, so it is an honor for me to dedicate this thesis to her memory.

CHAPTER 1

INTRODUCTION

1.1 Background Information

This thesis topic originated at the University of Calgary from Dr. Edward A. Silver, Professor and Carma Chair in operations management. A company had contacted Dr. Silver to get guidance on personnel scheduling. This company was concerned with night-time scheduling of employees. The night-time work varied, but had to be finished nightly. Since benefits are paid by the employer and part-time employees must be given full benefits under Canadian law, the company was interested in maximizing the use of full-time employees. This problem can be easily formulated as a linear programming problem, but since both full-time and part-time employees are utilized, this cannot be solved with linear programming techniques. This would lead one to believe that only mixed integer linear programming (MILP) techniques could be used to solve the problem.

1.2 Objective

It was not known if an optimal solution could be obtained by using only MILP techniques, or if there was some heuristic that would also arrive at the optimal solution. One objective of this thesis is to determine if, indeed, the optimal solution to the employee scheduling problem can result only from applying a MILP technique.

A detailed description of the scheduling problem will be followed by a short discussion of linear programming (LP), integer programming (IP) and MILP. Portions of two key algorithms, the (k, m) -cyclic staffing algorithm and the first period principle, are incorporated into the heuristic. An explanation of these algorithms, how they are incorporated into the heuristic, and how to compare the heuristic to a MILP is given. Finally, general conclusions from a monte carlo analysis and suggestions for further analysis relating to this problem are presented.

CHAPTER 2
DETAILED PROBLEM DESCRIPTION

This particular warehouse is in operation Sunday through Thursday nights. The workload requirements are known for each of these nights, but may vary drastically from night to night. These requirements are met by utilizing part-time employees when the exact workload requirements are not met by full-time employees. An employee is designated as a full-time employee when forty hours per week are worked under any of the following schedules. The first type of schedule assigns the employee to work Sunday through Thursday nights, eight hours per night. The second through sixth types of schedules assign employees to work four ten-hour nights with the fifth night off. The difference between the four ten hour schedule types is just which night the employee has off. A summary of each of the six schedule types is shown in Table 2.1.

Table 2.1. Summary of Employee Schedule Types.

Type	Sunday	Monday	Tuesday	Wednesday	Thursday
1	ON	ON	ON	ON	ON
2	OFF	ON	ON	ON	ON
3	ON	OFF	ON	ON	ON
4	ON	ON	OFF	ON	ON
5	ON	ON	ON	OFF	ON
6	ON	ON	ON	ON	OFF

Since the company must pay benefits to all employees, the goal of the management is to maximize the number of full-time employees who are on the night shift, while at the same time exactly fulfilling the nightly workload requirements. The first step in obtaining a solution was to determine if any algorithms exist that solve this problem. Several analyses of five day work-weeks (with two days off) exist: Tibrewala, Phillipe and Brown's algorithm (Management Science, 1972), Bechtold and Showalter's algorithm (Production and Inventory Management, 1985), Bechtold's accelerated procedure (Operations Management, 1981), first period principle (Industrial Engineering, 1979, 1980), and Monroe's algorithm (Industrial Engineering, 1970), just to mention a few. Analyses also exist on the four-day work-week: Brown and Ravinder's algorithm (Institute of Transportation Engineers 57th Annual Meeting, 1987) and the first period principle (Industrial Engineering, 1979, 1980).

No documentation was found for cases where when both four-day and five-day work schedules are permitted. Of course, a MILP technique would solve this problem, but is there another algorithm which also solves the problem? There is, but first an overview of programming techniques will be presented.

CHAPTER 3

LINEAR, INTEGER AND MIXED INTEGER LINEAR PROGRAMMING

3.1 Linear Programming

A linear program maximizes or minimizes a linear equation (called an objective function) subject to a set of linear restrictions (called constraints). Mathematically, a linear program can be written as shown in equation 3.1 or equation 3.2 (Linear Programming and Extensions, 1981, Chapter three):

$$\text{Maximize: } z = \sum_{j=1}^n c_j x_j \quad (3.1)$$

$$\text{Subject to: } \sum_{j=1}^n a_{ij} x_j \leq b_i \quad i = 1, \dots, n$$

where

- z = objective,
- c_j = profit for decision variable j ,
- x_j = decision variable,
- a_{ij} = cost of decision variables,
- b_i = constraint requirements, and
- c_j, a_{ij}, b_i, x_i are all real numbers and all $x_i \geq 0.0$.

or,

$$\text{Minimize: } z = \sum_{j=1}^n c_j x_j \quad (3.2)$$

$$\text{Subject to: } \sum_{j=1}^n a_{ij} x_j \geq b_i \quad i = 1, \dots, n$$

where z = objective,
 c_j = cost of decision variable,
 x_j = decision variable,
 a_{ij} = profit of decision variables,
 b_i = constraint requirements, and
 c_j, a_{ij}, b_i, x_i are all real numbers, and all $x_i \geq 0.0$.

Current LP techniques either converge to a solution rapidly, or quickly indicate there is no feasible solution. LP techniques such as the (revised) simplex method have been not only thoroughly analyzed but also have been incorporated into commercial software products. Most of the commercial LP products handle a large number of variables and/or constraints and are very reliable (Linear Programming and Extensions, 1981, Chapter seven).

3.2 Integer Programming

Linear programming does not require that the decision variables be integer. This is the constraint that integer programming (IP) adds to the linear programming model. Problems formulated as IP's are much more difficult to solve than problems formulated as LP's. A naive approach to solving an IP problem is to simply round the decision variables to integer. This may seem like a valid step to take, but the rounded solution may

not be feasible. If, however, the solution is feasible, it is not guaranteed to be optimal (Introduction to Operations Research, 1990 pp. 467-468). Analytic IP methods usually have degeneracy problems; that is, due to numerical errors these methods will tend to take a long time to converge (Integer Programming, 1975 pp. 505-525). Another problem with application of IP is there is a small number of commercially available products that solve IP's, and the ones that are available tend to take very long to run. Most successful IP algorithms use a technique whereby the integer constraint is relaxed; the problem is solved with LP techniques and then rounded to an integer solution.

3.3 Mixed Integer Linear Programming

A Mixed integer linear programming (MILP) has a mixture of LP and IP; that is, some decision variables must be integers, while others are allowed to be real. In addition, any MILP can be re-formulated as an IP which implies that MILP techniques have the same types of solution problems as IP problems: they are difficult to solve (Integer Programming, 1975 p. 253).

CHAPTER 4

HEURISTIC BACKGROUND

The heuristic to solve this scheduling problem was developed from a (k, m) -cyclic staffing problem discussed by Bartholdi, Orlin and Ratliffe (Operations Research, 1980 pp. 1074-1085). The (k, m) -cyclic staffing algorithm incorporates the roundoff procedure described in the first period principle (FPP) developed by Propp (IBM Corporation Internal Report, 1978) and updated by Browne and Propp (Industrial Engineering, 1980, p. 12). This section presents the (k, m) -cyclic staffing problem and the roundoff procedure.

4.1 (k, m) -Cyclic Staffing Problem

The (k, m) -cyclic staffing problem described by Bartholdi, Orlin and Ratliffe minimizes linear cost of a number of employees working k consecutive shifts in an m -period cycle, while meeting the workload requirements. This method will be explained using a step-by-step example.

The first step in solving the (k, m) -cyclic staffing problem is to fully define the problem. The example shown will consider the typical five-day work week with two consecutive days off. The possibilities are shown in Table 4.1; an entry of "on" in the table means that an employee would work that day, while an "off" signifies that the employee would have the

day off. For example, an employee with a type-1 schedule works Monday through Friday, with Saturday and Sunday off.

Table 4.1 Scheduling possibilities five days on, two days off.

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Type 1	ON	ON	ON	ON	ON	OFF	OFF
Type 2	ON	ON	ON	ON	OFF	OFF	ON
Type 3	ON	ON	ON	OFF	OFF	ON	ON
Type 4	ON	ON	OFF	OFF	ON	ON	ON
Type 5	ON	OFF	OFF	ON	ON	ON	ON
Type 6	OFF	OFF	ON	ON	ON	ON	ON
Type 7	OFF	ON	ON	ON	ON	ON	OFF

Suppose the company must staff 100 employees on Monday, 95 employees on Tuesday, 83 employees on Wednesday, 104 employees on Thursday, 97 employees on Friday, 111 employees on Saturday and 103 employees on Sunday. These employee staffing requirements are summarized in Table 4.2.

Table 4.2 Employee Daily Requirements

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
100	95	83	104	97	111	103

In addition, suppose that no type of employee work schedule has any precedence over any other type, which implies that the cost for each type of schedule is equal. Though this may not be a realistic assumption it will be adhered to, for the sake of explaining the technique. If x_i represents the number of employees on work schedule i , and the costs of

each type of schedule are assumed to be one, for simplicity, the objective function of the (5,7)-cyclic staffing problem is defined by equation 4.1.

$$\text{Minimize } z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 \quad (4.1)$$

The profit of each type of employee schedule is also one. For example, if an employee is scheduled on a type-1 schedule, then that employee fulfills one employee requirement every day from Monday to Friday, but not on Saturday or Sunday. Equation 4.2 shows the corresponding constraint for a type-1 schedule.

$$x_1 + x_2 + x_3 + x_4 + x_5 \geq 100. \quad (4.2)$$

The constraints for the other types of schedules can be formulated similarly. Equation 4.3 presents the complete formulation.

$$\begin{array}{ll} \text{Minimize } & z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 \quad (4.3) \\ \text{Subject To:} & \\ & x_1 + x_2 + x_3 + x_4 + x_5 \geq 100 \quad \text{Monday's requirement,} \\ & x_1 + x_2 + x_3 + x_4 + x_7 \geq 95 \quad \text{Tuesday's requirement,} \\ & x_1 + x_2 + x_3 + x_6 + x_7 \geq 83 \quad \text{Wednesday's requirement,} \\ & x_1 + x_2 + x_5 + x_6 + x_7 \geq 104 \quad \text{Thursday's requirement,} \\ & x_1 + x_4 + x_5 + x_6 + x_7 \geq 97 \quad \text{Friday's requirement,} \\ & x_3 + x_4 + x_5 + x_6 + x_7 \geq 111 \quad \text{Saturday's requirement,} \\ & x_2 + x_3 + x_4 + x_5 + x_6 \geq 103 \quad \text{Sunday's requirement,} \\ \text{and, } & x_i \geq 0, \text{ and } x_i \text{ are integer for all } i. \end{array}$$

The next step in Bartholdi, Orlin and Ratliffe's method involves finding the LP solution. It should be noted that this portion of the method relaxes the constraint that all x_i be integer, which is not realistic since the units are employees (people). The LP solution was found using a software package called STORM . STORM is a commercial software package consisting of several modeling techniques, including LP and IP.

The optimal LP solution schedules 2.8 type-1 employees, which implies that 2.8 type-1 employees are scheduled every day, Monday through Friday, and no type-1 employees are scheduled Saturday or Sunday. The optimal solution for the other types are: 24.8 type-2, 16.8 type-3, 17.8 type-4, 37.8 type-5, 5.8 type-6, and 32.8 type-7 employees. The schedule types are shown in Table 4.1, and the optimal solutions are summarized in Table 4.3.

The total number of employees scheduled on a specific day can be found by summing the number of employees scheduled for each of the types that are scheduled on that day. These daily totals are shown in Table 4.3. Notice that these daily totals exactly match the daily requirements shown in Table 4.2: 100 employees are scheduled on Monday, 95 on Tuesday, 83 on Wednesday, 104 on Thursday, 97 on Friday, 111 on Saturday and 103 on Sunday.

Table 4.3 LP Solution Summary For Different Schedule Types

Type	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
1	2.8	2.8	2.8	2.8	2.8	0	0
2	24.8	24.8	24.8	24.8	0	0	24.8
3	16.8	16.8	16.8	0	0	16.8	16.8
4	17.8	17.8	0	0	17.8	17.8	17.8
5	37.8	0	0	37.8	37.8	37.8	37.8
6	0	0	5.8	5.8	5.8	5.8	5.8
7	0	32.8	32.8	32.8	32.8	32.8	0
Total	100	95	83	104	97	111	103

4.2 Roundoff Procedure

The LP solution would be optimal if it were feasible, but since the integer constraint was relaxed, this is not the case. A roundoff procedure to arrive at an integer solution is the next step in the Bartholdi, Orlin and Ratliffe method. This procedure originates from the First Period Principle, which is described in Appendix A. The first step in the roundoff procedure is to obtain the cumulative sums of the number of employees assigned to each of the schedule types (defined by the LP solution, Table 4.3). This is shown in Table 4.4. To obtain an integer solution the sums are rounded up as shown in Table 4.5.

Table 4.4 Cumulative Employees Assigned To Schedule Types

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
LP Solution*	2.8	24.8	16.8	17.8	37.8	5.8	32.8
Cumulative Sum**	2.8	27.6	44.4	62.2	100	105.8	138.6

* Obtained From STORM

** Calculate the Cumulative Sums of the LP solutions across the different types.

Table 4.5 Integer Cumulative Employees assigned to schedule types

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
Cumulative Sum*	2.8	27.6	44.4	62.2	100	105.8	138.6
Integer Sum**	3	28	45	63	100	106	139

* Obtained From Table 4.4.

** Round the cumulative sum up.

Finally, to determine the total number of employees to schedule, the (integer) cumulative number of employees from the previous day must be subtracted from each day's integer sum. This is shown in Table 4.6. Employees are scheduled as follows: three employees with

Saturday and Sunday off (type-1), twenty-five employees with Friday and Saturday off (type-2), seventeen employees with Thursday and Friday off (type-3), eighteen employees with Wednesday and Thursday off (type-4), thirty-seven employees with Tuesday and Wednesday off (type-5), six employees with Monday and Tuesday off (type-6) and thirty-three employees scheduled with Sunday and Monday off (type-7).

Table 4.6 Final employee assignment to schedule types

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
Integer Sum*	3	28	45	63	100	106	139
Previous Sum**	0	3	28	45	63	100	106
Number To Assign***	3	25	17	18	37	6	33

* Obtained From Table 4.5.

** Previous days sum, type-1 has subtracts 0.

*** Difference of integer sum and the previous sum.

Table 4.6 presents employee scheduling by schedule types. Using the "number to assign", each of the types is assigned by days in Table 4.7. For example, three employees are scheduled on a type-1 schedule, implying they will work Monday through Friday, with Saturday and Sunday off. Twenty-five employees are scheduled on a type-2 schedule, meaning they will work Monday through Thursday and Sunday. The remaining types are shown in table 4.7.

Table 4.7 Final Daily Employee Schedule By Type

Type	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
1	3	3	3	3	3	0	0
2	25	25	25	25	0	0	25
3	17	17	17	0	0	17	17
4	18	18	0	0	18	18	18
5	37	0	0	37	37	37	37
6	0	0	6	6	6	6	6
7	0	33	33	33	33	33	0
Daily Sums	100	96	84	104	97	111	103

The total number of employees scheduled is 139, and all daily requirements have been met. One note about the solution: Tuesday and Wednesday's requirements have both been exceeded by one.

CHAPTER 5

HEURISTIC METHOD

The major differences between the (k, m) -cyclic staffing method and the heuristic are the formulation and the finishing steps. The formulations are different because the two problems are different. The (k, m) -cyclic staffing method minimizes the linear cost of employees working k consecutive shifts in an m -period cycle. Since the company must pay benefits to all employees, full-time employees are more desirable; therefore, the heuristic maximizes the number of full-time employees, while at the same time exactly fulfilling the workload requirements. The finishing steps are required in this method to allow assignment of part-time employees to fulfill any hourly requirements not met by full-time employees. The formulation, LP solution, roundoff procedure and finishing steps of the heuristic will be presented by example in this section.

5.1 Formulation

The employee schedule types for this problem are repeated in Table 5.1. The table shows that an employee assigned to a type-1 schedule works five eight-hour days, while the other five types work ten hours a day on their assigned days.

Table 5.1 Summary of Employee Schedule Types

	Sunday	Monday	Tuesday	Wednesday	Thursday
Type 1	ON	ON	ON	ON	ON
Type 2	OFF	ON	ON	ON	ON
Type 3	ON	OFF	ON	ON	ON
Type 4	ON	ON	OFF	ON	ON
Type 5	ON	ON	ON	OFF	ON
Type 6	ON	ON	ON	ON	OFF

Suppose that the requirements for each night of the week are those shown in the following table (Table 5.2).

Table 5.2 Employee daily requirements by hours.

Sunday	Monday	Tuesday	Wednesday	Thursday
135	114	106	152	151

The (k, m) -cyclic scheduling problem assumes that no type of schedule has a priority higher than any other type of schedule. This implies that the cost of each type of employee hour is one, no matter what type of schedule that employee is assigned to. This assumption is also valid in the heuristic. If x_i represents the number of employee hours assigned to a type i employee schedule, then the objective function for maximizing the number of full-time employees is:

$$\text{Maximize} \quad z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 \quad (5.1)$$

Each full-time employee who is assigned to work on Sunday night fulfills hourly requirements on Sunday night. Any employee assigned to schedule types one or three through six fulfills requirements for Sunday night (equation 5.2).

$$x_1 + x_3 + x_4 + x_5 + x_6 \leq 135 \tag{5.2}$$

The reason this constraint is a less-than-or-equal-to constraint is that part-time employees will work any hours not met by full-time employees. This implies that full-time employee hours must not exceed any daily requirement, nor should full-time plus part-time employee hours exceed any daily requirement.

Similarly, any full-time employee scheduled on Monday night is assigned to schedule types one, two, or four through six (equation 5.3).

$$x_1 + x_2 + x_4 + x_5 + x_6 \leq 114 \tag{5.3}$$

The constraints for the remaining nights, Tuesday through Thursday, can be determined in a similar manner. The complete formulation for this problem is shown in equation 5.4.

$$\begin{aligned} \text{Maximize} \quad & z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 \\ \text{Subject To:} \end{aligned} \tag{5.4}$$

- $x_1 + x_3 + x_4 + x_5 + x_6 \leq 135$ Sun requirement,
 - $x_1 + x_2 + x_4 + x_5 + x_6 \leq 114$ Mon requirement,
 - $x_1 + x_2 + x_3 + x_5 + x_6 \leq 106$ Tues requirement,
 - $x_1 + x_2 + x_3 + x_4 + x_6 \leq 152$ Wed requirement,
 - $x_1 + x_2 + x_3 + x_4 + x_5 \leq 151$ Thurs requirement,
- and, $x_i \geq 0$, and x_i are integer for all i .

5.2 Linear Programming Solution

The next step in the heuristic after problem formulation, similar to the Bartholdi, Orlin and Ratliffe (k, m)-cyclic scheduling algorithm, is solving the formulation as a linear programming problem. The solution is found by relaxing the integer constraints on the employee hours.

STORM was used to determine the LP solution. This solution assigned 29.5 employee hours to a type-1 schedule, meaning that employees working a type-1 schedule are responsible for 29.5 hours on the nights when they are scheduled (Monday through Thursday). The results of the other types are shown in Table 5.3.

Table 5.3 LP Solution Summary For Different Schedule Types

	Sunday	Monday	Tuesday	Wednesday	Thursday
Type 1	0	0	0	0	0
Type 2	0	29.5	29.5	29.5	29.5
Type 3	50.5	0	50.5	50.5	50.5
Type 4	58.5	58.5	0	58.5	58.5
Type 5	12.5	12.5	12.5	0	12.5
Type 6	13.5	13.5	13.5	13.5	0
Daily Totals	135	114	106	152	151

The total number of employee hours scheduled for each day is found by summing the number of employee hours scheduled for each of the types that are scheduled on that day. This is also shown in Table 5.3. These totals exactly match the daily requirements shown in Table 5.2. Once the LP solution has been found, an integer solution must be found. This is achieved using the roundoff procedure explained in the next section.

5.3 Roundoff Procedure

The roundoff procedure is the next step in the heuristic. Again, this follows the Bartholdi, Orlin and Ratliffe (k, m)-cyclic scheduling method. The roundoff procedure must be performed on the LP solution since the integer constraint on the employee hours was relaxed.

The first step in the roundoff procedure is to calculate the cumulative sums of the number of employee hours assigned to each of the schedule types defined by the LP solution. The cumulative sums are shown in Table 5.4.

Table 5.4 Cumulative Employee Assignments Over Schedule Types.

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution*	0.0	29.5	50.5	58.5	12.5	13.5
Cumulative Sum**	0.0	29.5	80.0	138.5	151.0	165.0

*Obtained from STORM

**Calculate the cumulative sums of the LP solutions across the different schedule types.

Next, the integer constraint must be applied by rounding the cumulative sums up. This is shown in Table 5.5.

Table 5.5 Integer cumulative sums over the different schedule types.

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Cumulative Sum*	0.0	29.5	50.5	58.5	12.5	13.5
Integer Sum**	0	30	80	139	151	165

*Obtained from Table 5.4

**Round the cumulative sums up to arrive at integer values.

The next step in the roundoff procedure is to subtract the integer cumulative number of employee hours from the previous day from the integer cumulative employee hours of the current day to get the number of employee hours to assign to each type of schedule. This results in thirty employee hours allocated to a type-2 schedule, fifty employee hours allocated to a type-3 schedule, fifty-nine hours allocated to a type-4 schedule, twelve hours allocated to a type-5 schedule, and fourteen hours allocated to a type-6 schedule. These results are summarized in Table 5.6.

Table 5.6 Initial Employee Schedule By Schedule Types.

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Integer Sum **	0	30	80	139	151	165
Previous Sum **	0	0	30	80	139	151
Initial Schedule **	0	30	50	59	12	14

* Obtained from Table 5.5

** Previous types integer sum, (type-1 use 0).

*** Subtract the previous sum from the integer sum.

This is the point where the heuristic diverges from Bartholdi, Orlin, and Ratliffe's (k, m)-cyclic scheduling method. The schedule types, as shown in Table 5.1, have an hourly constraint each day for full-time employees. For example, a type-1 full-time employee may work only eight hours on each of the scheduled days; likewise, a type two, three, four, five or six employee may work only ten hours per day. These constraints are not applied in the Bartholdi II, Orlin and Ratliffe method. The heuristic requires finishing steps to apply these constraints.

5.4 Finishing Steps

First, using Table 5.1 and the initial schedule in Table 5.6, a summary table of the initial schedule is shown in Table 5.7.

Table 5.7 Initial Schedule

	Sunday	Monday	Tuesday	Wednesday	Thursday
Type 1	0	0	0	0	0
Type 2	0	30	30	30	30
Type 3	50	0	50	50	50
Type 4	59	59	0	59	59
Type 5	12	12	12	0	12
Type 6	14	14	14	14	0

Notice the fifty-nine hours that are supposed to be assigned to type-4 employees cannot be satisfied with only type-4 employees (there is nine hours of part time work in the fifty-nine hours). If only full-time employees are utilized, a fifty-nine hour requirement is impossible, since they are allowed to work only ten hours per day. If six full-time employees were assigned to this schedule, the fifty-nine hours allotted to this type of schedule would be exceeded, and if five full-time employees were assigned to this schedule, nine hours would be unaccounted for. To determine the remaining hours that need to be scheduled, the possible full-time hours are deleted from the total hours shown in Table 5.7. For example, full-time employees assigned to a type-2 schedule can cover all thirty required hours (three employees working ten-hour days). Likewise, full-time employees can cover all fifty required hours for a type-

3 schedule (five employees working ten-hour days). Unfortunately, full-time employees assigned to a type-4 schedule can cover only fifty of the fifty-nine hours. The extra nine hours will be set aside to be assigned later. This situation also occurs in type-5 and type-6 schedules. A breakout of the full-time hours assigned is presented in Table 5.8.

Table 5.8 Initial full-time assignments.

Schedule Type	# Full-time Employees	Hours Allowed Per Employee	Mon	Tues	Wed	Thurs	Fri
1	0	8	0	0	0	0	0
2	3	10	0	30	30	30	30
3	5	10	50	0	50	50	50
4	5	10	50	50	0	50	50
5	1	10	10	10	10	0	10
6	1	10	10	10	10	10	0
Daily Totals			120	100	100	140	140

The hours remaining to be assigned are determined by subtracting the hours assigned to full-time employees from the initial schedule shown in Table 5.7. For instance, schedule types one, two, and three completely cover the initial hours assigned with full-time employees. Schedule type four, on the other hand, requires 59 total hours to be scheduled. Five full-time employees have been scheduled at ten hours per day leaving nine hours remaining. These nine hours still need to be assigned to employees. Schedule type five has two remaining hours to be scheduled, and schedule type six has four remaining hours to be scheduled. The remaining hours to be scheduled are shown in Table 5.9.

Table 5.9 Remaining hours to schedule.

	Sunday	Monday	Tuesday	Wednesday	Thursday
Type 1	0	0	0	0	0
Type 2	0	0	0	0	0
Type 3	0	0	0	0	0
Type 4	9	9	0	9	9
Type 5	2	2	2	0	2
Type 6	4	4	4	4	0
Total	15	15	6	13	11

Before the remaining hours can be scheduled, a check must be done to determine if the daily full-time hours plus the daily remaining hours will exceed any of the daily requirements. If this happens, then the remaining hours must be adjusted so that the final assigned hours will exactly satisfy the daily requirements. The sum, of the daily assigned full-time hours (shown in Table 5.8) and the daily remaining hours (Table 5.9), is the hours that will be scheduled if the requirements are not checked. In this example, one hundred and thirty-five employee hours will be scheduled on Sunday night, and one hundred and fifteen, one hundred and six, one hundred and fifty-three, and one hundred and fifty-one employee hours will be scheduled on Monday, Tuesday, Wednesday and Thursday nights respectively. These sums are shown in Table 5.10.

Table 5.10 Total non adjusted hours to be scheduled.

	Sunday	Monday	Tuesday	Wednesday	Thursday
Full-time Hours	120	100	100	140	140
Remaining Hours	15	15	6	13	11
Total	135	115	106	153	151

The daily requirements are subtracted from these sums to determine the amount to adjust the remaining hours. For example, the requirements will be exactly met on Sunday, Tuesday and Thursday nights, while the remaining hours on Monday and Wednesday nights must be adjusted so the requirements for those days will be exactly met. This is shown in Table 5.11.

Table 5.11 Daily adjustment hours.

	Sunday	Monday	Tuesday	Wednesday	Thursday
Total Hours	135	115	106	153	151
Required Hours	135	114	106	152	151
Total Adjustment	0	1	0	1	0

After the daily adjustment hours are determined, the new remaining hours left to be scheduled can be found by subtracting the total adjustment values just determined from the remaining hours. This would imply that there are really fourteen hours remaining to be scheduled on Monday night and twelve hours remaining to be scheduled on Wednesday night. The other nights are not affected. This is shown in Table 5.12.

Table 5.12 New remaining hours to assign.

	Sunday	Monday	Tuesday	Wednesday	Thursday
Remaining Hours	15	15	6	13	11
Total Adjustment	0	1	0	1	0
Final Remaining Hours To Schedule	15	14	6	12	11

The remaining hours are assigned, if possible, first to full-time employees and then to part-time employees. To do this, the three steps are repeated until none of the three is able to assign any hours. The steps are as follows.

Step one : If all five days have remaining hours greater than eight, then assign to a type-1 schedule (eight hours per day five days per week). The number of employees to assign is determined by dividing the

minimum number of remaining hours by eight and rounding down. For example, if the minimum number of remaining hours is twenty-five, then the number of hours to assign is the integer portion of $25/8$, or three employees. If this step assigned any hours to a full-time employee, skip step two.

Step two: If at least four days have remaining hours greater than ten, then determine which day has the minimum number of remaining hours. This determines the schedule type to which hours will be assigned. For example, if the minimum number of remaining hours is on a Tuesday, then any assignment will be made to the type of work schedule that has Tuesday off (type-4), or if the minimum number of remaining hours is on a Thursday, then the assignment will be made to a type of work schedule that has Thursday off (type-6). After the type of schedule to assign to has been determined, the number of employees to assign must be determined. The number of employees is determined by dividing the second minimum number of remaining hours by ten, and rounding down. For example, if the second minimum number of hours is fourteen, then the number of hours to assign is integer($14 / 10$), or one employee.

Step three: If hours were assigned by either step one or step two, the number of remaining hours is adjusted by subtracting the number of hours that were assigned each day; then the three steps would be repeated. If hours were not assigned by steps one or two, then the remaining hours must be assigned to part-time employees and the

solution is complete. These three steps are shown below for this example.

In this example all five days do not have remaining hours greater-than-or-equal-to eight, so hours cannot be assigned by step one. Four days do have remaining hours greater-than ten, so hours are assigned according to step 2. That is, employees will be assigned to a schedule type with Tuesday off (since Tuesday has the minimum number of hours remaining), which is a type-4 schedule. The number of employees to assign to a type-4 schedule is the integer portion of $11/10$, or one employee. So, one employee is assigned to work ten hours on Sunday, Monday, Wednesday and Thursday nights. Next, step three requires the remaining hours be readjusted. This is shown in Table 5.13.

Table 5.13 Adjustment of remaining hours.

	Sunday	Monday	Tuesday	Wednesday	Thursday
Hours	15	14	6	12	11
Assigned Hours	10	10	0	10	10
Remaining Hours	5	4	6	2	1

The cycle starts again. There are not five days with remaining hours greater-than-or-equal-to eight, and there are not four days with remaining hours greater-than-or-equal-to ten.

Step three then explains that the remaining hours are assigned to part-time employees. These part-time hours are shown in Table 5.13 in the row entitled "Remaining Hours."

The employee assignments, including the initial full-time assignments (Table 5.8) and the remaining hour assignments for full-time employees and part-time employees (Table 5.13) are summarized in Table 5.14. Notice that the daily workload requirements are exactly met each day, and sixteen full-time employees have been scheduled.

Table 5.14 Final daily assignments of employees

Schedule Type	# Full-time Employees	Full-time Hours Allowed / Employee	Mon	Tues	Wed	Thurs	Fri
1	0	8	0	0	0	0	0
2	3	10	0	30	30	30	30
3	5	10	50	0	50	50	50
4	5	10	50	50	0	50	50
5	1	10	10	10	10	0	10
6	1	10	10	10	10	10	0
4	1	10	10	10	0	10	10
Part-time			5	4	6	2	1
Daily Totals			135	114	106	152	151

CHAPTER 6

MILP COMPARISON

One purpose of this thesis is to determine if the optimal solution can be obtained without using a MILP solution. This section will describe the formulation of the MILP for this problem, the solution, and the comparison to the example in section 5.

6.1 MILP Formulation

The objective of this problem is to maximize the number of full-time employees. If x_i represents the number of full-time employees (as opposed to the number of full-time hours) assigned to schedule types i as defined in Table 2.1 then the objective function of the MILP is:

$$\text{Maximize } z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 \quad (6.1)$$

Since an employee assigned to a type-1 schedule works five days a week eight hours a day, the cost of a type-1 employee is eight on each night (since type-1 schedules include Sunday through Thursday nights).

Similarly, the other types of employees work ten hour shifts, so the cost for these employees is 10 on the nights that they are assigned to work.

Schedule types one, and three through six require employees to work Sunday nights, while type-2 employee does not. The cost of a type-1 employee is eight, while the cost of a type three through six employee is ten. Assume P_s represents the number of part-time employees

scheduled to work on Sunday night and the daily requirements are the same as described in chapter 4, then the constraint for Sunday night is:

$$8x_1 + 10x_3 + 10x_4 + 10x_5 + 10x_6 + P_s = 135 \quad (6.2)$$

The constraints for the other nights can be constructed in a similar manner. The final formulation is as follows:

$$\text{Maximize } z = x_1 + x_2 + x_3 + x_4 + x_5 + x_6 \quad (6.3)$$

Subject To:

$$8x_1 + 10x_3 + 10x_4 + 10x_5 + 10x_6 + P_s = 135, \text{ Sun req.}$$

$$8x_1 + 10x_2 + 10x_4 + 10x_5 + 10x_6 + P_m = 114, \text{ Mon req.}$$

$$8x_1 + 10x_2 + 10x_3 + 10x_5 + 10x_6 + P_t = 106, \text{ Tuesy req.}$$

$$8x_1 + 10x_2 + 10x_3 + 10x_4 + 10x_6 + P_w = 152, \text{ Wed req.}$$

$$8x_1 + 10x_2 + 10x_3 + 10x_4 + 10x_5 + P_r = 151, \text{ Thurs req.}$$

$$x_i \geq 0,$$

where,

x_1 = number of full-time employees scheduled on a type-1 schedule,

P_s = part-time employees scheduled on Sunday night,

P_m = part-time employees scheduled on Monday night,

P_t = part-time employees scheduled on Tuesday night,

P_w = part-time employees scheduled on Wednesday night,

P_r = part-time employees scheduled on Thursday night,

and x_i are integer for all i .

6.2 MILP Solution

The MILP solution was obtained using STORM. The solution assigned three employees to a type-1 work schedule, two employees to a type-2 work schedule, four employees to a type-3 work schedule, five employees to a type-4 work schedule, one employee to a type-5 work schedule, and one employee to a type-6 work schedule. The part-time employee hours were assigned as follows: one hour scheduled on Sunday, no hours scheduled on Monday, two hours scheduled on Tuesday, eight hours scheduled on Wednesday, and seven hours scheduled on Thursday.

6.3 Comparison to heuristic

Both the MILP solution and the heuristic assigned 16 full-time employees. Thus, the heuristic proves to be optimal in this case. The next chapter will investigate several cases to determine if the heuristic always achieves optimality.

CHAPTER 7

MONTE CARLO ANALYSIS

A monte carlo analysis was performed to determine how well the heuristic really performs. The data sets for this monte carlo analysis were created from a table of normal random numbers (Woolsey, private communication). The random numbers were manipulated to define daily requirements; the manipulation consisted of multiplying the random variable by 10 and adding the result to 100. Sixty data sets are shown in Tables 7.1 and 7.2. These data sets are the right hand sides of the formulation shown in chapter five. The first step in the heuristic is to find the LP solutions of each of the test cases. These are shown in Table 7.3 and Table 7.4. A step by step procedure for each of the test cases is documented in appendix B. A summary of the heuristic results is presented in Table 7.5 and Table 7.6. These tables also present the STORM solutions to the MILP problems. A quick scan of the data would lead one to believe the heuristic always arrives at an optimal solution; however, this is not the case. The heuristic assigns 12 full-time employees (case 19), while the MILP assigns 13 full-time employees. Another case (57) also did not achieve optimality using the heuristic; the heuristic assigned eleven full-time employees versus the MILP's assignment of twelve full-time employees.

Table 7.1 Monte Carlo Data Sets

Test Case	Sunday	Monday	Tuesday	Wednesday	Thursday
1	105	101	125	97	99
2	103	97	113	102	90
3	105	100	88	102	84
4	105	98	95	75	101
5	115	96	94	107	109
6	114	108	90	91	81
7	97	95	112	102	81
8	106	135	113	95	110
9	114	94	100	103	129
10	120	97	104	104	100
11	109	95	95	106	109
12	91	116	102	81	104
13	93	97	94	111	107
14	110	108	100	89	112
15	85	95	98	99	110
16	102	104	107	96	96
17	95	109	98	95	79
18	95	97	84	108	93
19	114	102	104	108	102
20	93	110	85	97	101
21	83	117	99	88	95
22	109	95	80	72	98
23	91	110	108	102	98
24	97	94	114	99	82
25	90	106	94	116	101
26	104	98	103	90	90
27	104	83	105	111	99
28	111	93	100	91	100
29	114	89	91	112	98
30	98	112	74	94	111

Table 7.2 Monte Carlo Data Sets

Test Case	Sunday	Monday	Tuesday	Wednesday	Thursday
31	104	106	109	102	91
32	101	75	96	95	94
33	95	89	95	108	102
34	117	99	106	91	88
35	97	96	118	105	79
36	80	112	89	104	98
37	102	103	106	97	79
38	101	83	97	95	130
39	95	81	105	98	105
40	105	101	115	110	114
41	109	112	85	93	114
42	95	86	90	100	114
43	82	99	87	110	103
44	82	88	107	96	86
45	102	102	123	100	89
46	108	104	95	103	110
47	87	97	102	87	113
48	106	104	86	98	97
49	125	95	94	113	100
50	95	100	98	84	104
51	99	114	91	100	91
52	112	86	90	107	107
53	83	111	112	81	104
54	89	97	106	101	109
55	85	91	102	113	94
56	94	98	91	88	97
57	108	102	83	96	104
58	106	88	99	100	108
59	113	99	91	102	98
60	96	107	91	94	104

Table 7.3 LP Solution

Test Case	x_1	x_2	x_3	x_4	x_5	x_6
1	0.0	26.75	30.75	6.75	34.75	32.75
2	0.0	23.25	29.25	13.25	24.25	36.25
3	0.0	14.75	19.75	31.75	17.75	35.75
4	0.0	13.50	20.50	23.50	43.50	17.50
5	0.0	15.25	34.25	36.25	23.25	21.25
6	0.0	7.00	13.00	31.00	30.00	40.00
7	0.0	24.75	26.75	9.75	19.75	40.75
8	0.0	33.75	4.75	26.75	44.75	29.75
9	0.0	21.00	41.00	35.00	32.00	6.00
10	0.0	11.25	34.25	27.25	27.25	31.25
11	0.0	19.50	33.50	33.50	22.50	19.50
12	0.0	32.50	7.50	21.50	42.50	19.50
13	0.0	32.50	28.50	31.50	14.50	18.50
14	0.0	19.75	21.75	29.75	40.75	17.75
15	0.0	36.75	26.75	23.75	22.75	11.75
16	0.0	24.25	22.25	19.25	30.25	30.25
17	0.0	24.00	10.00	21.00	24.00	40.00
18	0.0	24.25	22.25	35.25	11.25	26.25
19	0.0	18.50	30.50	28.50	24.50	30.50
20	0.0	28.50	11.50	36.50	24.50	20.50
21	0.0	37.50	3.50	21.50	32.50	25.50
22	0.0	4.50	18.50	33.50	41.50	15.50
23	0.0	36.25	17.25	19.25	25.25	29.25
24	0.0	24.50	27.50	7.50	22.50	39.50
25	0.0	36.75	20.75	32.75	10.75	27.75
26	0.0	17.25	23.25	18.25	31.25	31.25
27	0.0	21.50	42.50	20.50	14.50	26.50
28	0.0	12.75	30.75	23.75	32.75	23.75
29	0.0	12.00	37.00	35.00	14.00	28.00
30	0.0	24.25	10.25	48.25	28.25	11.25

Table 7.4 LP Solution

Test Case	x_1	x_2	x_3	x_4	x_5	x_6
31	0.0	24.00	22.00	19.00	26.00	37.00
32	0.0	14.25	40.25	19.25	20.25	21.25
33	0.0	27.25	33.25	27.25	14.25	20.25
34	0.0	8.25	26.25	19.25	34.25	37.25
35	0.0	26.75	27.75	5.75	18.75	44.75
36	0.0	40.75	8.75	31.75	16.75	22.75
37	0.0	19.75	18.75	15.75	24.75	42.75
38	0.0	24.33	42.33	28.33	30.33	0.00
39	0.0	26.00	40.00	16.00	23.00	16.00
40	0.0	31.25	35.25	21.25	26.25	22.25
41	0.0	19.25	16.25	43.25	35.25	14.25
42	0.0	26.25	35.25	31.25	21.25	7.25
43	0.0	38.25	21.25	33.25	10.25	17.25
44	0.0	32.75	26.75	7.75	18.75	28.75
45	0.0	27.00	27.00	6.00	29.00	40.00
46	0.0	22.00	26.00	35.00	27.00	20.00
47	0.0	34.50	24.50	19.50	34.50	8.50
48	0.0	16.75	18.75	36.75	24.75	25.75
49	0.0	6.75	36.75	37.75	18.75	31.75
50	0.0	25.25	20.25	22.25	36.25	16.25
51	0.0	24.75	9.75	32.75	23.75	32.75
52	0.0	13.50	39.50	35.50	18.50	18.50
53	0.0	39.75	11.75	10.75	41.75	18.75
54	0.0	36.50	28.50	19.50	24.50	16.50
55	0.0	36.25	30.25	19.25	8.25	27.25
56	0.0	23.00	19.00	26.00	29.00	20.00
57	0.0	15.25	21.25	40.25	27.25	19.25
58	0.0	19.25	37.25	26.25	25.25	17.25
59	0.0	12.75	26.75	34.75	23.75	27.75
60	0.0	27.00	16.00	32.00	29.00	19.00

Table 7.5 Heuristic Results and Comparison To MILP

Test Case	x_1	x_1	x_1	x_1	x_1	x_1	Full Time Employees	MILP Solution
1	11	2	3	0	3	3	12	12
2	2	2	2	1	2	3	12	12
3	1	1	2	3	1	3	11	11
4	1	1	2	2	4	1	11	11
5	1	1	3	3	2	2	12	12
6	0	0	1	3	3	4	11	11
7	1	2	2	1	1	4	11	11
8	1	3	0	2	4	3	13	13
9	1	2	4	3	3	0	13	13
10	1	1	3	2	2	3	12	12
11	0	2	3	3	2	2	12	12
12	0	4	0	2	4	2	12	12
13	2	3	2	3	1	1	12	12
14	0	2	2	3	4	1	12	12
15	1	3	2	2	2	1	12	12
16	0	2	2	2	3	3	12	12
17	0	2	1	2	2	4	11	11
18	1	2	2	3	1	2	11	11
19	1	1	3	2	2	3	12	13
20	1	2	1	3	2	2	11	11
21	1	3	0	2	3	2	11	11
22	1	0	1	3	4	1	11	11
23	2	3	1	1	2	3	12	12
24	1	2	2	0	2	4	11	11
25	1	3	2	3	1	2	12	12
26	1	1	2	1	3	3	11	11
27	1	2	4	2	1	2	12	12
28	1	1	3	2	3	2	12	12
29	2	1	3	3	1	2	12	12
30	1	2	1	4	2	1	11	11

Table 7.6 Heuristic Results and Comparison To MILP

Test Case	x_1	x_1	x_1	x_1	x_1	x_1	Full Time Employees	MILP Solution
31	0	2	2	3	2	3	12	12
32	0	1	4	2	2	2	11	11
33	0	3	3	2	1	2	11	11
34	3	0	2	1	3	3	12	12
35	3	2	2	0	1	4	12	12
36	0	4	1	3	1	2	11	11
37	0	2	2	1	2	4	11	11
38	0	2	4	3	3	0	12	12
39	0	3	4	1	2	1	11	11
40	0	3	3	3	2	2	13	13
41	0	2	2	4	3	1	12	12
42	0	2	3	3	2	1	11	11
43	0	32	3	3	1	1	11	11
44	3	3	2	0	1	2	11	11
45	0	2	2	0	4	4	12	12
46	0	2	2	3	3	2	12	12
47	0	3	2	2	3	1	11	11
48	3	1	1	3	2	2	12	12
49	0	0	3	3	3	3	12	12
50	0	2	2	2	4	1	11	11
51	0	3	1	3	2	3	12	12
52	3	1	3	3	1	1	12	12
53	0	4	1	1	4	2	12	12
54	2	3	2	2	2	1	12	12
55	0	3	3	3	0	2	11	11
56	2	2	1	2	2	2	11	11
57	0	1	2	4	2	2	11	12
58	2	2	3	2	2	1	12	12
59	0	1	3	3	2	3	12	12
60	3	2	1	3	2	1	12	12

CHAPTER 8

CONCLUSIONS AND FURTHER ANALYSIS

The benefits of the heuristic versus the problems of a MILP technique will be discussed in this section along with some suggested analysis that would be interesting to examine.

8.1 Conclusions

One of the most beneficial aspects of using this type of heuristic as opposed to a MILP technique is the stability of using a LP solution to arrive at an integer solution. Again, the computer solution to a MILP formulation often will have infeasible or non optimal solutions, while an analytic solution will usually have degeneracy problems. In contrast, the heuristic will converge to a linear solution rapidly, and the rest of the solution is essentially basic arithmetic. The heuristic was optimal in almost 97% of the cases tried, or 58 out of 60 cases.

8.2 Suggestions for Further Analysis

This problem assumes that any type of full-time work schedule is equivalent to another; in reality this may not be the case. A company may employ more people who would rather work four ten-hour days versus five eight-hour days. Future analysis could take this constraint into account.

The first period principle rounds the real variables up to get an integer solution; it would be interesting to see what the effects of rounding down would be.

Another interesting study would be to take the actual cost of the employees (salaries, benefits, etc.) into account.

8.3 Implications of this Study

It was proposed that a heuristic algorithm would be defined to generate a high percentage of optimality for the type of scheduling problems defined in this thesis, without recourse to mixed integer linear programming. With a randomly generated data set the heuristic of this thesis has fulfilled this requirement acceptably. The advantages of the method are (1) only linear programming techniques are used and (2) only four additional rules are implemented to achieve a good, but not necessarily optimal, solution quickly.

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APPENDIX A
FIRST PERIOD PRINCIPLE

The first period principle was developed from J. A. Propp, and has undergone several modifications. The algorithm has been proven optimal. The most recent algorithm consist of six steps as quoted (Introduction to Employee Scheduling, 1992, pp. 94-98):

Step One: List daily requirements for the weekly cycle.

Step Two: Assign necessary employees to meet the requirements day by day (i.e., assigning the number needed to meet the requirements remaining after any preceding assignments have been taken into account).

Step Three: Continue assigning employees, as per Step 2, until a repeating set of weekly cycles occurs. This will always occur.

Step Four: Average the number of employees assigned (started) per period over the repeating cycle.

Step Five: Obtain the cumulative sums of the (perhaps) fractional assignments for successive periods, rounding off to the next higher integer.

Step Six: Subtract succeeding cumulative integer values to obtain starting day assignments for employees.

APPENDIX B
MONTE CARLO TEST CASES

An empty worksheet used to solve the heuristic is shown on the next page. The first step in solving the heuristic on this worksheet is to enter the daily requirements. Next, the LP solution is entered in the row entitled "LP solution". Then, the cumulative sums of the LP solutions are calculated ("cumulative sum" row). The integer sums are rounded down (Integer Sum). Finally, the previous days sum ("Previous Sum" row) is subtracted from the "integer sum" row. This results in the initial assignment.

The next step allows the user to visualize the results of the initial solution by inserting the employee types into the appropriate days. This is shown in the "initial assignment" section. The full time workers are also tallied in the column labelled "# FT".

The "Remaining Hours" section contains the number of part-time hours remaining after the full time hours have been excluded. The last assignment section contains the "finishing steps" discussed in chapter five. Finally, the final assignment is shown by types ("Last Assignment" row), and totalled ("Number Of Full Time Employees" row).

The worksheets following the empty worksheet represent each of the sixty test cases.

Requirements						
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution						
Cumulative Solution						
Integer Sum						
Previous Sum						
Initial Schedule						
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1						
Type 2						
Type 3						
Type 4						
Type 5						
Type 6						
Total						
Remaining Hours						
Type 1						
Type 2						
Type 3						
Type 4						
Type 5						
Type 6						
Total						
Last Assignment						
Slack						
Adjusted Remaining Hours						Hours
Full Time Hours Assigned						
Part Time Hours						
Final Assignment Type						
Number Last Assignment						
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment						
Last Assignment						
Number Of Full Time						
Employees						

Requirements						
Sunday	105					
Monday	101					
Tuesday	125					
Wednesday	97					
Thursday	99					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	26.75	30.75	6.75	34.75	32.75
Cumulative Solution	0	26.75	57.5	64.25	99	131.75
Integer Sum	0	27	58	65	99	132
Previous Sum	0	0	27	58	65	99
Initial Schedule	0	27	31	7	34	33
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	27	27	27	27	2
Type 3	31	0	31	31	31	3
Type 4	7	7	0	7	7	0
Type 5	34	34	34	0	34	3
Type 6	33	33	33	33	0	3
Total	105	101	125	98	99	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	1	0	1	1	1	
Type 4	7	7	0	7	7	
Type 5	4	4	4	0	4	
Type 6	3	3	3	3	0	
Total	15	21	15	18	19	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	15	21	15	17	19	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	13	7	9	11	
Final Assignment Type	1					
Number Assigned	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	3	0	3	3
Last Assignment	1	0	0	0	0	0
	1	2	3	0	3	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	103					
Monday	97					
Tuesday	113					
Wednesday	102					
Thursday	90					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	23.25	29.25	13.25	24.25	36.25
Cumulative Solution	0	23.25	52.5	65.75	90	126.25
Integer Sum	0	24	53	66	90	127
Previous Sum	0	0	24	53	66	90
Initial Schedule	0	24	29	13	24	37
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	24	24	24	24	2
Type 3	29	0	29	29	29	2
Type 4	13	13	0	13	13	1
Type 5	24	24	24	0	24	2
Type 6	37	37	37	37	0	3
Total	103	98	114	103	90	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	9	0	9	9	9	
Type 4	3	3	0	3	3	
Type 5	4	4	4	0	4	
Type 6	7	7	7	7	0	
Total	23	18	24	23	20	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	23	17	23	22	20	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	7	1	7	6	4	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	1	2	3
Last Assignment	2	0	0	0	0	0
	2	2	2	1	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	105					
Monday	100					
Tuesday	88					
Wednesday	102					
Thursday	84					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	14.75	19.75	31.75	17.75	35.75
Cumulative Solution	0	14.75	34.5	66.25	84	119.75
Integer Sum	0	15	35	67	84	120
Previous Sum	0	0	15	35	67	84
Initial Schedule	0	15	20	32	17	36
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	15	15	15	15	1
Type 3	20	0	20	20	20	2
Type 4	32	32	0	32	32	3
Type 5	17	17	17	0	17	1
Type 6	36	36	36	36	0	3
Total	105	100	88	103	84	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	0	0	0	0	0	
Type 4	2	2	0	2	2	
Type 5	7	7	7	0	7	
Type 6	6	6	6	6	0	
Total	15	20	18	13	14	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	15	20	18	12	14	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	12	10	4	6	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	2	3	1	3
Last Assignment	1	0	0	0	0	0
	1	1	2	3	1	3
Number Of Full Time						
Employees	11					

Requirements						
Sunday	105					
Monday	98					
Tuesday	95					
Wednesday	75					
Thursday	101					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	13.5	20.5	23.5	43.5	17.5
Cumulative Solution	0	13.5	34	57.5	101	118.5
Integer Sum	0	14	34	58	101	119
Previous Sum	0	0	14	34	58	101
Initial Schedule	0	14	20	24	43	18
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	14	14	14	14	1
Type 3	20	0	20	20	20	2
Type 4	24	24	0	24	24	2
Type 5	43	43	43	0	43	4
Type 6	18	18	18	18	0	1
Total	105	99	95	76	101	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	0	0	0	0	0	
Type 4	4	4	0	4	4	
Type 5	3	3	3	0	3	
Type 6	8	8	8	8	0	
Total	15	19	15	16	11	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	15	18	15	15	11	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	10	7	7	3	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	2	2	4	1
Last Assignment	1	0	0	0	0	0
	1	1	2	2	4	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	115					
Monday	96					
Tuesday	94					
Wednesday	107					
Thursday	109					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	15.25	34.25	36.25	23.25	21.25
Cumulative Solution	0	15.25	49.5	85.75	109	130.25
Integer Sum	0	16	50	86	109	131
Previous Sum	0	0	16	50	86	109
Initial Schedule	0	16	34	36	23	22
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	16	16	16	16	1
Type 3	34	0	34	34	34	3
Type 4	36	36	0	36	36	3
Type 5	23	23	23	0	23	2
Type 6	22	22	22	22	0	2
Total	115	97	95	108	109	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	6	6	6	6	
Type 3	4	0	4	4	4	
Type 4	6	6	0	6	6	
Type 5	3	3	3	0	3	
Type 6	2	2	2	2	0	
Total	15	17	15	18	19	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	16	14	17	19	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	8	6	9	11	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	3	2	2
Last Assignment	1	0	0	0	0	0
	1	1	3	3	2	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	114					
Monday	108					
Tuesday	90					
Wednesday	91					
Thursday	81					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	7	13	31	30	40
Cumulative Solution	0	7	20	51	81	121
Integer Sum	0	7	20	51	81	121
Previous Sum	0	0	7	20	51	81
Initial Schedule	0	7	13	31	30	40
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	7	7	7	7	0
Type 3	13	0	13	13	13	1
Type 4	31	31	0	31	31	3
Type 5	30	30	30	0	30	3
Type 6	40	40	40	40	0	4
Total	114	108	90	91	81	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	3	0	3	3	3	
Type 4	1	1	0	1	1	
Type 5	0	0	0	0	0	
Type 6	0	0	0	0	0	
Total	4	8	10	11	11	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	4	8	10	11	11	Hours
Full Time Hours Assigned	0	0	0	0	0	0
Part Time Hours	4	8	10	11	11	
Final Assignment Type	0					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	0	1	3	3	4
Last Assignment	0	0	0	0	0	0
	0	0	1	3	3	4
Number Of Full Time						
Employees	11					

Requirements						
Sunday	97					
Monday	95					
Tuesday	112					
Wednesday	102					
Thursday	81					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.75	26.75	9.75	19.75	40.75
Cumulative Solution	0	24.75	51.5	61.25	81	121.75
Integer Sum	0	25	52	62	81	122
Previous Sum	0	0	25	52	62	81
Initial Schedule	0	25	27	10	19	41
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	27	0	27	27	27	2
Type 4	10	10	0	10	10	1
Type 5	19	19	19	0	19	1
Type 6	41	41	41	41	0	4
Total	97	95	112	103	81	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	7	0	7	7	7	
Type 4	0	0	0	0	0	
Type 5	9	9	9	0	9	
Type 6	1	1	1	1	0	
Total	17	15	22	13	21	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	17	15	22	12	21	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	9	7	14	4	13	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	1	1	4
Last Assignment	1	0	0	0	0	0
	1	2	2	1	1	4
Number Of Full Time						
Employees	11					

Requirements						
Sunday	106					
Monday	135					
Tuesday	113					
Wednesday	95					
Thursday	110					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	33.75	4.75	26.75	44.75	29.75
Cumulative Solution	0	33.75	38.5	65.25	110	139.75
Integer Sum	0	34	39	66	110	140
Previous Sum	0	0	34	39	66	110
Initial Schedule	0	34	5	27	44	30
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	34	34	34	34	3
Type 3	5	0	5	5	5	0
Type 4	27	27	0	27	27	2
Type 5	44	44	44	0	44	4
Type 6	30	30	30	30	0	3
Total	106	135	113	96	110	12
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	5	0	5	5	5	
Type 4	7	7	0	7	7	
Type 5	4	4	4	0	4	
Type 6	0	0	0	0	0	
Total	16	15	13	16	20	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	16	15	13	15	20	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	8	7	5	7	12	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	0	2	4	3
Last Assignment	1	0	0	0	0	0
	1	3	0	2	4	3
Number Of Full Time						
Employees	13					

Requirements						
Sunday	114					
Monday	94					
Tuesday	100					
Wednesday	103					
Thursday	129					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	21	41	35	32	6
Cumulative Solution	0	21	62	97	129	135
Integer Sum	0	21	62	97	129	135
Previous Sum	0	0	21	62	97	129
Initial Schedule	0	21	41	35	32	6
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	21	21	21	21	2
Type 3	41	0	41	41	41	4
Type 4	35	35	0	35	35	3
Type 5	32	32	32	0	32	3
Type 6	6	6	6	6	0	0
Total	114	94	100	103	129	12
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	1	1	1	1	
Type 3	1	0	1	1	1	
Type 4	5	5	0	5	5	
Type 5	2	2	2	0	2	
Type 6	6	6	6	6	0	
Total	14	14	10	13	9	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	14	14	10	13	9	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	6	6	2	5	1	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	4	3	3	0
Last Assignment	1	0	0	0	0	0
	1	2	4	3	3	0
Number Of Full Time						
Employees	13					

Requirements						
Sunday	120					
Monday	97					
Tuesday	104					
Wednesday	104					
Thursday	100					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	11.25	34.25	27.25	27.25	31.25
Cumulative Solution	0	11.25	45.5	72.75	100	131.25
Integer Sum	0	12	46	73	100	132
Previous Sum	0	0	12	46	73	100
Initial Schedule	0	12	34	27	27	32
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	12	12	12	12	1
Type 3	34	0	34	34	34	3
Type 4	27	27	0	27	27	2
Type 5	27	27	27	0	27	2
Type 6	32	32	32	32	0	3
Total	120	98	105	105	100	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	2	2	2	2	
Type 3	4	0	4	4	4	
Type 4	7	7	0	7	7	
Type 5	7	7	7	0	7	
Type 6	2	2	2	2	0	
Total	20	18	15	15	20	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	20	17	14	14	20	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	12	9	6	6	12	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	2	2	3
Last Assignment	1	0	0	0	0	0
	1	1	3	2	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	109					
Monday	95					
Tuesday	95					
Wednesday	106					
Thursday	109					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	19.5	33.5	33.5	22.5	19.5
Cumulative Solution	0	19.5	53	86.5	109	128.5
Integer Sum	0	20	53	87	109	129
Previous Sum	0	0	20	53	87	109
Initial Schedule	0	20	33	34	22	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	20	20	20	20	2
Type 3	33	0	33	33	33	3
Type 4	34	34	0	34	34	3
Type 5	22	22	22	0	22	2
Type 6	20	20	20	20	0	2
Total	109	96	95	107	109	12
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	3	0	3	3	3	
Type 4	4	4	0	4	4	
Type 5	2	2	2	0	2	
Type 6	0	0	0	0	0	
Total	9	6	5	7	9	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	9	5	5	6	9	Hours
Full Time Hours Assigned	0	0	0	0	0	0
Part Time Hours	9	5	5	6	9	
Final Assignment Type	0					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	3	3	2	2
Last Assignment	0	0	0	0	0	0
	0	2	3	3	2	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	91					
Monday	116					
Tuesday	102					
Wednesday	81					
Thursday	104					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	32.5	7.5	21.5	42.5	19.5
Cumulative Solution	0	32.5	40	61.5	104	123.5
Integer Sum	0	33	40	62	104	124
Previous Sum	0	0	33	40	62	104
Initial Schedule	0	33	7	22	42	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	33	33	33	33	3
Type 3	7	0	7	7	7	0
Type 4	22	22	0	22	22	2
Type 5	42	42	42	0	42	4
Type 6	20	20	20	20	0	2
Total	91	117	102	82	104	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	7	0	7	7	7	
Type 4	2	2	0	2	2	
Type 5	2	2	2	0	2	
Type 6	0	0	0	0	0	
Total	11	7	12	12	14	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	11	6	12	11	14	Hours
Full Time Hours Assigned	1	0	1	1	1	10
Part Time Hours	1	6	2	1	4	
Final Assignment Type	2					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	0	2	4	2
Last Assignment	0	1	0	0	0	0
	0	4	0	2	4	2
Number Of Full Time						
Employees	12					

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Requirements						
Sunday	93					
Monday	97					
Tuesday	94					
Wednesday	111					
Thursday	107					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	32.5	28.5	31.5	14.5	18.5
Cumulative Solution	0	32.5	61	92.5	107	125.5
Integer Sum	0	33	61	93	107	126
Previous Sum	0	0	33	61	93	107
Initial Schedule	0	33	28	32	14	19
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	33	33	33	33	3
Type 3	28	0	28	28	28	2
Type 4	32	32	0	32	32	3
Type 5	14	14	14	0	14	1
Type 6	19	19	19	19	0	1
Total	93	98	94	112	107	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	8	0	8	8	8	
Type 4	2	2	0	2	2	
Type 5	4	4	4	0	4	
Type 6	9	9	9	9	0	
Total	23	18	24	22	17	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	23	17	24	21	17	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	7	1	8	5	1	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	3	1	1
Last Assignment	2	0	0	0	0	0
	2	3	2	3	1	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	110					
Monday	108					
Tuesday	100					
Wednesday	89					
Thursday	112					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	19.75	21.75	29.75	40.75	17.75
Cumulative Solution	0	19.75	41.5	71.25	112	129.75
Integer Sum	0	20	42	72	112	130
Previous Sum	0	0	20	42	72	112
Initial Schedule	0	20	22	30	40	18
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	20	20	20	20	2
Type 3	22	0	22	22	22	2
Type 4	30	30	0	30	30	3
Type 5	40	40	40	0	40	4
Type 6	18	18	18	18	0	1
Total	110	108	100	90	112	12
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	2	0	2	2	2	
Type 4	0	0	0	0	0	
Type 5	0	0	0	0	0	
Type 6	8	8	8	8	0	
Total	10	8	10	10	2	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	10	8	10	9	2	Hours
Full Time Hours Assigned	0	0	0	0	0	0
Part Time Hours	10	8	10	9	2	
Final Assignment Type	0					
Number Last Assignment	0					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	3	4	1
Last Assignment	0	0	0	0	0	0
	0	2	2	3	4	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	85					
Monday	95					
Tuesday	98					
Wednesday	99					
Thursday	110					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	36.75	26.75	23.75	22.75	11.75
Cumulative Solution	0	36.75	63.5	87.25	110	121.75
Integer Sum	0	37	64	88	110	122
Previous Sum	0	0	37	64	88	110
Initial Schedule	0	37	27	24	22	12
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	37	37	37	37	3
Type 3	27	0	27	27	27	2
Type 4	24	24	0	24	24	2
Type 5	22	22	22	0	22	2
Type 6	12	12	12	12	0	1
Total	85	95	98	100	110	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	7	0	7	7	7	
Type 4	4	4	0	4	4	
Type 5	2	2	2	0	2	
Type 6	2	2	2	2	0	
Total	15	15	18	20	20	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	15	15	18	19	20	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	7	10	11	12	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	2	2	1
Last Assignment	1	0	0	0	0	0
	1	3	2	2	2	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	102					
Monday	104					
Tuesday	107					
Wednesday	96					
Thursday	96					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.25	22.25	19.25	30.25	30.25
Cumulative Solution	0	24.25	46.5	65.75	96	126.25
Integer Sum	0	25	47	66	96	127
Previous Sum	0	0	25	47	66	96
Initial Schedule	0	25	22	19	30	31
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	22	0	22	22	22	2
Type 4	19	19	0	19	19	1
Type 5	30	30	30	0	30	3
Type 6	31	31	31	31	0	3
Total	102	105	108	97	96	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	2	0	2	2	2	
Type 4	9	9	0	9	9	
Type 5	0	0	0	0	0	
Type 6	1	1	1	1	0	
Total	12	15	8	17	16	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	12	14	7	16	16	Hours
Full Time Hours Assigned	1	1	0	1	1	10
Part Time Hours	2	4	7	6	6	
Final Assignment Type	4					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	1	3	3
Last Assignment	0	0	0	1	0	0
	0	2	2	2	3	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	95					
Monday	109					
Tuesday	98					
Wednesday	95					
Thursday	79					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24	10	21	24	40
Cumulative Solution	0	24	34	55	79	119
Integer Sum	0	24	34	55	79	119
Previous Sum	0	0	24	34	55	79
Initial Schedule	0	24	10	21	24	40
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	24	24	24	24	2
Type 3	10	0	10	10	10	1
Type 4	21	21	0	21	21	2
Type 5	24	24	24	0	24	2
Type 6	40	40	40	40	0	4
Total	95	109	98	95	79	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	0	0	0	0	0	
Type 4	1	1	0	1	1	
Type 5	4	4	4	0	4	
Type 6	0	0	0	0	0	
Total	5	9	8	5	9	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	5	9	8	5	9	Hours
Full Time Hours Assigned	0	0	0	0	0	0
Part Time Hours	5	9	8	5	9	
Final Assignment Type	0					
Number Last Assignment	0					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	2	2	4
Last Assignment	0	0	0	0	0	0
	0	2	1	2	2	4
Number Of Full Time						
Employees	11					

Requirements						
Sunday	95					
Monday	97					
Tuesday	84					
Wednesday	108					
Thursday	93					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.25	22.25	35.25	11.25	26.25
Cumulative Solution	0	24.25	46.5	81.75	93	119.25
Integer Sum	0	25	47	82	93	120
Previous Sum	0	0	25	47	82	93
Initial Schedule	0	25	22	35	11	27
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	22	0	22	22	22	2
Type 4	35	35	0	35	35	3
Type 5	11	11	11	0	11	1
Type 6	27	27	27	27	0	2
Total	95	98	85	109	93	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	2	0	2	2	2	
Type 4	5	5	0	5	5	
Type 5	1	1	1	0	1	
Type 6	7	7	7	7	0	
Total	15	18	15	19	13	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	17	14	18	13	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	9	6	10	5	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	3	1	2
Last Assignment	1	0	0	0	0	0
	1	2	2	3	1	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	114					
Monday	102					
Tuesday	104					
Wednesday	108					
Thursday	102					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	18.5	30.5	28.5	24.5	30.5
Cumulative Solution	0	18.5	49	77.5	102	132.5
Integer Sum	0	19	49	78	102	133
Previous Sum	0	0	19	49	78	102
Initial Schedule	0	19	30	29	24	31
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	19	19	19	19	1
Type 3	30	0	30	30	30	3
Type 4	29	29	0	29	29	2
Type 5	24	24	24	0	24	2
Type 6	31	31	31	31	0	3
Total	114	103	104	109	102	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	9	9	9	9	
Type 3	0	0	0	0	0	
Type 4	9	9	0	9	9	
Type 5	4	4	4	0	4	
Type 6	1	1	1	1	0	
Total	14	23	14	19	22	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	14	22	14	18	22	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	6	14	6	10	14	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	2	2	3
Last Assignment	1	0	0	0	0	0
	1	1	3	2	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	93					
Monday	110					
Tuesday	85					
Wednesday	97					
Thursday	101					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	28.8	11.5	36.5	24.5	20.5
Cumulative Solution	0	28.8	40.3	76.8	101.3	121.8
Integer Sum	0	29	41	77	102	122
Previous Sum	0	0	29	41	77	102
Initial Schedule	0	29	12	36	25	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	29	29	29	29	2
Type 3	12	0	12	12	12	1
Type 4	36	36	0	36	36	3
Type 5	25	25	25	0	25	2
Type 6	20	20	20	20	0	2
Total	93	110	86	97	102	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	9	9	9	9	
Type 3	2	0	2	2	2	
Type 4	6	6	0	6	6	
Type 5	5	5	5	0	5	
Type 6	0	0	0	0	0	
Total	13	20	16	17	22	
Last Assignment						
Slack	0	0	1	0	1	
Adjusted Remaining Hours	13	20	15	17	21	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	5	12	7	9	13	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	3	2	2
Last Assignment	1	0	0	0	0	0
	1	2	1	3	2	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	83					
Monday	117					
Tuesday	99					
Wednesday	88					
Thursday	95					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	37.5	3.5	21.5	32.5	25.5
Cumulative Solution	0	37.5	41	62.5	95	120.5
Integer Sum	0	38	41	63	95	121
Previous Sum	0	0	38	41	63	95
Initial Schedule	0	38	3	22	32	26
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	38	38	38	38	3
Type 3	3	0	3	3	3	0
Type 4	22	22	0	22	22	2
Type 5	32	32	32	0	32	3
Type 6	26	26	26	26	0	2
Total	83	118	99	89	95	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	8	8	8	8	
Type 3	3	0	3	3	3	
Type 4	2	2	0	2	2	
Type 5	2	2	2	0	2	
Type 6	6	6	6	6	0	
Total	13	18	19	19	15	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	13	17	19	18	15	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	5	9	11	10	7	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	0	2	3	2
Last Assignment	1	0	0	0	0	0
	1	3	0	2	3	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	109					
Monday	95					
Tuesday	80					
Wednesday	72					
Thursday	98					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	4.5	18.5	33.5	41.5	15.5
Cumulative Solution	0	4.5	23	56.5	98	113.5
Integer Sum	0	5	23	57	98	114
Previous Sum	0	0	5	23	57	98
Initial Schedule	0	5	18	34	41	16
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	5	5	5	5	0
Type 3	18	0	18	18	18	1
Type 4	34	34	0	34	34	3
Type 5	41	41	41	0	41	4
Type 6	16	16	16	16	0	1
Total	109	96	80	73	98	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	8	0	8	8	8	
Type 4	4	4	0	4	4	
Type 5	1	1	1	0	1	
Type 6	6	6	6	6	0	
Total	19	16	20	23	18	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	19	15	20	22	18	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Full Time Hours Assigned	1	0	1	1	1	10
Part Time Hours	1	7	2	4	0	
Final Assignment Type	1	3				
Number Last Assignment	1	1				
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	0	1	3	4	1
Last Assignment	1	0	1	0	0	0
	1	0	2	3	4	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	91					
Monday	110					
Tuesday	108					
Wednesday	102					
Thursday	98					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	36.25	17.25	19.25	25.25	29.25
Cumulative Solution	0	36.25	53.5	72.75	98	127.25
Integer Sum	0	37	54	73	98	128
Previous Sum	0	0	37	54	73	98
Initial Schedule	0	37	17	19	25	30
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	37	37	37	37	3
Type 3	17	0	17	17	17	1
Type 4	19	19	0	19	19	1
Type 5	25	25	25	0	25	2
Type 6	30	30	30	30	0	3
Total	91	111	109	103	98	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	7	0	7	7	7	
Type 4	9	9	0	9	9	
Type 5	5	5	5	0	5	
Type 6	0	0	0	0	0	
Total	21	21	19	23	28	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	21	20	18	22	28	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	5	4	2	6	12	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	1	1	2	3
Last Assignment	2	0	0	0	0	0
	2	3	1	1	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	97					
Monday	94					
Tuesday	114					
Wednesday	99					
Thursday	82					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.5	27.5	7.5	22.5	39.5
Cumulative Solution	0	24.5	52	59.5	82	121.5
Integer Sum	0	25	52	60	82	122
Previous Sum	0	0	25	52	60	82
Initial Schedule	0	25	27	8	22	40
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	27	0	27	27	27	2
Type 4	8	8	0	8	8	0
Type 5	22	22	22	0	22	2
Type 6	40	40	40	40	0	4
Total	97	95	114	100	82	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	7	0	7	7	7	
Type 4	8	8	0	8	8	
Type 5	2	2	2	0	2	
Type 6	0	0	0	0	0	
Total	17	15	14	20	22	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	17	14	14	19	22	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	9	6	6	11	14	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	0	2	4
Last Assignment	1	0	0	0	0	0
	1	2	2	0	2	4
Number Of Full Time						
Employees	11					

Requirements						
Sunday	90					
Monday	106					
Tuesday	94					
Wednesday	116					
Thursday	101					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	36.75	20.75	32.75	10.75	27.75
Cumulative Solution	0	36.75	57.5	90.25	101	128.75
Integer Sum	0	37	58	91	101	129
Previous Sum	0	0	37	58	91	101
Initial Schedule	0	37	21	33	10	28
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	37	37	37	37	3
Type 3	21	0	21	21	21	2
Type 4	33	33	0	33	33	3
Type 5	10	10	10	0	10	1
Type 6	28	28	28	28	0	2
Total	92	108	96	119	101	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	1	0	1	1	1	
Type 4	3	3	0	3	3	
Type 5	0	0	0	0	0	
Type 6	8	8	8	8	0	
Total	12	18	16	19	11	
Last Assignment						
Slack	2	2	2	3	0	
Adjusted Remaining Hours	10	16	14	16	11	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	2	8	6	8	3	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	3	1	2
Last Assignment	1	0	0	0	0	0
	1	3	2	3	1	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	104					
Monday	98					
Tuesday	103					
Wednesday	90					
Thursday	90					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	17.25	23.25	18.25	31.25	31.25
Cumulative Solution	0	17.25	40.5	58.75	90	121.25
Integer Sum	0	18	41	59	90	122
Previous Sum	0	0	18	41	59	90
Initial Schedule	0	18	23	18	31	32
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	18	18	18	18	1
Type 3	23	0	23	23	23	2
Type 4	18	18	0	18	18	1
Type 5	31	31	31	0	31	3
Type 6	32	32	32	32	0	3
Total	104	99	104	91	90	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	8	8	8	8	
Type 3	3	0	3	3	3	
Type 4	8	8	0	8	8	
Type 5	1	1	1	0	1	
Type 6	2	2	2	2	0	
Total	14	19	14	21	20	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	14	18	13	20	20	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	6	10	5	12	12	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	2	1	3	3
Last Assignment	1	0	0	0	0	0
	1	1	2	1	3	3
Number Of Full Time						
Employees	11					

Requirements						
Sunday	104					
Monday	83					
Tuesday	105					
Wednesday	111					
Thursday	99					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	21.5	42.5	20.5	14.5	26.5
Cumulative Solution	0	21.5	64	84.5	99	125.5
Integer Sum	0	22	64	85	99	126
Previous Sum	0	0	22	64	85	99
Initial Schedule	0	22	42	21	14	27
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	22	22	22	22	2
Type 3	42	0	42	42	42	4
Type 4	21	21	0	21	21	2
Type 5	14	14	14	0	14	1
Type 6	27	27	27	27	0	2
Total	104	84	105	112	99	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	2	2	2	2	
Type 3	2	0	2	2	2	
Type 4	1	1	0	1	1	
Type 5	4	4	4	0	4	
Type 6	7	7	7	7	0	
Total	14	14	15	12	9	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	14	13	15	11	9	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	6	5	7	3	1	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	4	2	1	2
Last Assignment	1	0	0	0	0	0
	1	2	4	2	1	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	111					
Monday	93					
Tuesday	100					
Wednesday	91					
Thursday	100					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	12.75	30.75	23.75	32.75	23.75
Cumulative Solution	0	12.75	43.5	67.25	100	123.75
Integer Sum	0	13	44	68	100	124
Previous Sum	0	0	13	44	68	100
Initial Schedule	0	13	31	24	32	24
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	13	13	13	13	1
Type 3	31	0	31	31	31	3
Type 4	24	24	0	24	24	2
Type 5	32	32	32	0	32	3
Type 6	24	24	24	24	0	2
Total	111	93	100	92	100	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	1	0	1	1	1	
Type 4	4	4	0	4	4	
Type 5	2	2	2	0	2	
Type 6	4	4	4	4	0	
Total	11	13	10	12	10	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	11	13	10	11	10	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	3	5	2	3	2	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	2	3	2
Last Assignment	1	0	0	0	0	0
	1	1	3	2	3	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	114					
Monday	89					
Tuesday	91					
Wednesday	112					
Thursday	98					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	12	37	35	14	28
Cumulative Solution	0	12	49	84	98	126
Integer Sum	0	12	49	84	98	126
Previous Sum	0	0	12	49	84	98
Initial Schedule	0	12	37	35	14	28
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	12	12	12	12	1
Type 3	37	0	37	37	37	3
Type 4	35	35	0	35	35	3
Type 5	14	14	14	0	14	1
Type 6	28	28	28	28	0	2
Total	114	89	91	112	98	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	2	2	2	2	
Type 3	7	0	7	7	7	
Type 4	5	5	0	5	5	
Type 5	4	4	4	0	4	
Type 6	8	8	8	8	0	
Total	24	19	21	22	18	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	24	19	21	22	18	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	8	3	5	6	2	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	3	1	2
Last Assignment	2	0	0	0	0	0
	2	1	3	3	1	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	98					
Monday	112					
Tuesday	74					
Wednesday	94					
Thursday	111					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.25	10.25	48.25	28.25	11.25
Cumulative Solution	0	24.25	34.5	82.75	111	122.25
Integer Sum	0	25	35	83	111	123
Previous Sum	0	0	25	35	83	111
Initial Schedule	0	25	10	48	28	12
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	10	0	10	10	10	1
Type 4	48	48	0	48	48	4
Type 5	28	28	28	0	28	2
Type 6	12	12	12	12	0	1
Total	98	113	75	95	111	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	0	0	0	0	0	
Type 4	8	8	0	8	8	
Type 5	8	8	8	0	8	
Type 6	2	2	2	2	0	
Total	18	23	15	15	21	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	18	22	14	14	21	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	10	14	6	6	13	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	4	2	1
Last Assignment	1	0	0	0	0	0
	1	2	1	4	2	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	104					
Monday	106					
Tuesday	109					
Wednesday	102					
Thursday	91					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24	22	19	26	37
Cumulative Solution	0	24	46	65	91	128
Integer Sum	0	24	46	65	91	128
Previous Sum	0	0	24	46	65	91
Initial Schedule	0	24	22	19	26	37
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	24	24	24	24	2
Type 3	22	0	22	22	22	2
Type 4	19	19	0	19	19	1
Type 5	26	26	26	0	26	2
Type 6	37	37	37	37	0	3
Total	104	106	109	102	91	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	2	0	2	2	2	
Type 4	9	9	0	9	9	
Type 5	6	6	6	0	6	
Type 6	7	7	7	7	0	
Total	24	26	19	22	21	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	24	26	19	22	21	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	8	10	3	6	5	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	1	2	3
Last Assignment	2	0	0	0	0	0
	2	2	2	1	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	101					
Monday	75					
Tuesday	96					
Wednesday	95					
Thursday	94					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	14.25	40.25	19.25	20.25	21.25
Cumulative Solution	0	14.25	54.5	73.75	94	115.25
Integer Sum	0	15	55	74	94	116
Previous Sum	0	0	15	55	74	94
Initial Schedule	0	15	40	19	20	22
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	15	15	15	15	1
Type 3	40	0	40	40	40	4
Type 4	19	19	0	19	19	1
Type 5	20	20	20	0	20	2
Type 6	22	22	22	22	0	2
Total	101	76	97	96	94	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	0	0	0	0	0	
Type 4	9	9	0	9	9	
Type 5	0	0	0	0	0	
Type 6	2	2	2	2	0	
Total	11	16	7	16	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	11	15	6	15	14	Hours
Full Time Hours Assigned	1	1	0	1	1	10
Part Time Hours	1	5	6	5	4	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	4	1	2	2
Last Assignment	1	0	0	0	0	0
	1	1	4	1	2	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	95					
Monday	89					
Tuesday	95					
Wednesday	108					
Thursday	102					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	27.25	33.25	27.25	14.25	20.25
Cumulative Solution	0	27.25	60.5	87.75	102	122.25
Integer Sum	0	28	61	88	102	123
Previous Sum	0	0	28	61	88	102
Initial Schedule	0	28	33	27	14	21
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	28	28	28	28	2
Type 3	33	0	33	33	33	3
Type 4	27	27	0	27	27	2
Type 5	14	14	14	0	14	1
Type 6	21	21	21	21	0	2
Total	95	90	96	109	102	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	8	8	8	8	
Type 3	3	0	3	3	3	
Type 4	7	7	0	7	7	
Type 5	4	4	4	0	4	
Type 6	1	1	1	1	0	
Total	15	20	16	19	22	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	19	15	18	22	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	11	7	10	14	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	3	2	1	2
Last Assignment	1	0	0	0	0	0
	1	2	3	2	1	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	117					
Monday	99					
Tuesday	106					
Wednesday	91					
Thursday	88					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	8.25	26.25	19.25	34.25	37.25
Cumulative Solution	0	8.25	34.5	53.75	88	125.25
Integer Sum	0	9	35	54	88	126
Previous Sum	0	0	9	35	54	88
Initial Schedule	0	9	26	19	34	38
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	9	9	9	9	0
Type 3	26	0	26	26	26	2
Type 4	19	19	0	19	19	1
Type 5	34	34	34	0	34	3
Type 6	38	38	38	38	0	3
Total	117	100	107	92	88	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	9	9	9	9	
Type 3	6	0	6	6	6	
Type 4	9	9	0	9	9	
Type 5	4	4	4	0	4	
Type 6	8	8	8	8	0	
Total	27	30	27	32	28	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	27	29	26	31	28	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	3	5	2	7	4	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	0	2	1	3	3
Last Assignment	3	0	0	0	0	0
	3	0	2	1	3	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	97					
Monday	96					
Tuesday	118					
Wednesday	105					
Thursday	79					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	26.75	27.75	5.75	18.75	44.75
Cumulative Solution	0	26.75	54.5	60.25	79	123.75
Integer Sum	0	27	55	61	79	124
Previous Sum	0	0	27	55	61	79
Initial Schedule	0	27	28	6	18	45
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	27	27	27	27	2
Type 3	28	0	28	28	28	2
Type 4	6	6	0	6	6	0
Type 5	18	18	18	0	18	1
Type 6	45	45	45	45	0	4
Total	97	96	118	106	79	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	8	0	8	8	8	
Type 4	6	6	0	6	6	
Type 5	8	8	8	0	8	
Type 6	5	5	5	5	0	
Total	27	26	28	26	29	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	27	26	28	25	29	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	3	2	4	1	5	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	0	1	4
Last Assignment	3	0	0	0	0	0
	3	2	2	0	1	4
Number Of Full Time						
Employees	12					

Requirements						
Sunday	80					
Monday	112					
Tuesday	89					
Wednesday	104					
Thursday	98					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	40.75	8.75	31.75	16.75	22.75
Cumulative Solution	0	40.75	49.5	81.25	98	120.75
Integer Sum	0	41	50	82	98	121
Previous Sum	0	0	41	50	82	98
Initial Schedule	0	41	9	32	16	23
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	41	41	41	41	4
Type 3	9	0	9	9	9	0
Type 4	32	32	0	32	32	3
Type 5	16	16	16	0	16	1
Type 6	23	23	23	23	0	2
Total	80	112	89	105	98	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	1	1	1	1	
Type 3	9	0	9	9	9	
Type 4	2	2	0	2	2	
Type 5	6	6	6	0	6	
Type 6	3	3	3	3	0	
Total	20	12	19	15	18	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	20	12	19	14	18	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	12	4	11	6	10	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	4	0	3	1	2
Last Assignment	1	0	0	0	0	0
	1	4	0	3	1	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	102					
Monday	103					
Tuesday	106					
Wednesday	97					
Thursday	79					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	19.75	18.75	15.75	24.75	42.75
Cumulative Solution	0	19.75	38.5	54.25	79	121.75
Integer Sum	0	20	39	55	79	122
Previous Sum	0	0	20	39	55	79
Initial Schedule	0	20	19	16	24	43
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	20	20	20	20	2
Type 3	19	0	19	19	19	1
Type 4	16	16	0	16	16	1
Type 5	24	24	24	0	24	2
Type 6	43	43	43	43	0	4
Total	102	103	106	98	79	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	9	0	9	9	9	
Type 4	6	6	0	6	6	
Type 5	4	4	4	0	4	
Type 6	3	3	3	3	0	
Total	22	13	16	18	19	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	22	13	16	17	19	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	14	5	8	9	11	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	1	2	4
Last Assignment	1	0	0	0	0	0
	1	2	1	1	2	4
Number Of Full Time						
Employees	11					

Requirements						
Sunday	101					
Monday	83					
Tuesday	97					
Wednesday	95					
Thursday	130					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.3333	42.3333	28.3333	30.3333	0
Cumulative Solution	0	24.3333	66.6666	94.9999	125.3332	125.3332
Integer Sum	0	25	67	95	126	126
Previous Sum	0	0	25	67	95	126
Initial Schedule	0	25	42	28	31	0
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	42	0	42	42	42	4
Type 4	28	28	0	28	28	2
Type 5	31	31	31	0	31	3
Type 6	0	0	0	0	0	0
Total	101	84	98	95	126	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	2	0	2	2	2	
Type 4	8	8	0	8	8	
Type 5	1	1	1	0	1	
Type 6	0	0	0	0	0	
Total	11	14	8	15	16	
Last Assignment						
Slack	0	1	1	0	-4	
Adjusted Remaining Hours	11	13	7	15	20	Hours
Full Time Hours Assigned	1	1	0	1	1	10
Part Time Hours	1	3	7	5	10	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	4	2	3	0
Last Assignment	1	0	0	0	0	0
	1	2	4	2	3	0
Number Of Full Time						
Employees	12					

Requirements						
Sunday	95					
Monday	81					
Tuesday	105					
Wednesday	98					
Thursday	105					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	26	40	16	23	16
Cumulative Solution	0	26	66	82	105	121
Integer Sum	0	26	66	82	105	121
Previous Sum	0	0	26	66	82	105
Initial Schedule	0	26	40	16	23	16
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	26	26	26	26	2
Type 3	40	0	40	40	40	4
Type 4	16	16	0	16	16	1
Type 5	23	23	23	0	23	2
Type 6	16	16	16	16	0	1
Total	95	81	105	98	105	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	6	6	6	6	
Type 3	0	0	0	0	0	
Type 4	6	6	0	6	6	
Type 5	3	3	3	0	3	
Type 6	6	6	6	6	0	
Total	15	21	15	18	15	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	15	21	15	18	15	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	13	7	10	7	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	4	1	2	1
Last Assignment	1	0	0	0	0	0
	1	2	4	1	2	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	105					
Monday	101					
Tuesday	115					
Wednesday	110					
Thursday	114					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	31.25	35.25	21.25	26.25	22.25
Cumulative Solution	0	31.25	66.5	87.75	114	136.25
Integer Sum	0	32	67	88	114	137
Previous Sum	0	0	32	67	88	114
Initial Schedule	0	32	35	21	26	23
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	32	32	32	32	3
Type 3	35	0	35	35	35	3
Type 4	21	21	0	21	21	2
Type 5	26	26	26	0	26	2
Type 6	23	23	23	23	0	2
Total	105	102	116	111	114	12
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	2	2	2	2	
Type 3	5	0	5	5	5	
Type 4	1	1	0	1	1	
Type 5	6	6	6	0	6	
Type 6	3	3	3	3	0	
Total	15	12	16	11	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	11	15	10	14	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	3	7	2	6	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	3	2	2	2
Last Assignment	1	0	0	0	0	0
	1	3	3	2	2	2
Number Of Full Time						
Employees	13					

Requirements						
Sunday	109					
Monday	112					
Tuesday	85					
Wednesday	93					
Thursday	114					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	19.25	16.25	43.25	35.25	14.25
Cumulative Solution	0	19.25	35.5	78.75	114	128.25
Integer Sum	0	20	36	79	114	129
Previous Sum	0	0	20	36	79	114
Initial Schedule	0	20	16	43	35	15
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	20	20	20	20	2
Type 3	16	0	16	16	16	1
Type 4	43	43	0	43	43	4
Type 5	35	35	35	0	35	3
Type 6	15	15	15	15	0	1
Total	109	113	86	94	114	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	6	0	6	6	6	
Type 4	3	3	0	3	3	
Type 5	5	5	5	0	5	
Type 6	5	5	5	5	0	
Total	19	13	16	14	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	19	12	15	13	14	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	11	4	7	5	6	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	4	3	1
Last Assignment	1	0	0	0	0	0
	1	2	1	4	3	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	95					
Monday	86					
Tuesday	90					
Wednesday	100					
Thursday	114					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	26.25	35.25	31.25	21.25	7.25
Cumulative Solution	0	26.25	61.5	92.75	114	121.25
Integer Sum	0	27	62	93	114	122
Previous Sum	0	0	27	62	93	114
Initial Schedule	0	27	35	31	21	8
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	27	27	27	27	2
Type 3	35	0	35	35	35	3
Type 4	31	31	0	31	31	3
Type 5	21	21	21	0	21	2
Type 6	8	8	8	8	0	0
Total	95	87	91	101	114	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	5	0	5	5	5	
Type 4	1	1	0	1	1	
Type 5	1	1	1	0	1	
Type 6	8	8	8	8	0	
Total	15	17	21	21	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	16	20	20	14	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	8	12	12	6	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	3	3	2	0
Last Assignment	1	0	0	0	0	0
	1	2	3	3	2	0
Number Of Full Time						
Employees	11					

Requirements						
Sunday	82					
Monday	99					
Tuesday	87					
Wednesday	110					
Thursday	103					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	38.25	21.25	33.25	10.25	17.25
Cumulative Solution	0	38.25	59.5	92.75	103	120.25
Integer Sum	0	39	60	93	103	121
Previous Sum	0	0	39	60	93	103
Initial Schedule	0	39	21	33	10	18
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	39	39	39	39	3
Type 3	21	0	21	21	21	2
Type 4	33	33	0	33	33	3
Type 5	10	10	10	0	10	1
Type 6	18	18	18	18	0	1
Total	82	100	88	111	103	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	9	9	9	9	
Type 3	1	0	1	1	1	
Type 4	3	3	0	3	3	
Type 5	0	0	0	0	0	
Type 6	8	8	8	8	0	
Total	12	20	18	21	13	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	12	19	17	20	13	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	4	11	9	12	5	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	3	1	1
Last Assignment	1	0	0	0	0	0
	1	3	2	3	1	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	82					
Monday	88					
Tuesday	107					
Wednesday	96					
Thursday	86					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	32.75	26.75	7.75	18.75	28.75
Cumulative Solution	0	32.75	59.5	67.25	86	114.75
Integer Sum	0	33	60	68	86	115
Previous Sum	0	0	33	60	68	86
Initial Schedule	0	33	27	8	18	29
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	33	33	33	33	3
Type 3	27	0	27	27	27	2
Type 4	8	8	0	8	8	0
Type 5	18	18	18	0	18	1
Type 6	29	29	29	29	0	2
Total	82	88	107	97	86	8
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	7	0	7	7	7	
Type 4	8	8	0	8	8	
Type 5	8	8	8	0	8	
Type 6	9	9	9	9	0	
Total	32	28	27	27	26	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	32	28	27	26	26	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	8	4	3	2	2	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	0	1	2
Last Assignment	3	0	0	0	0	0
	3	3	2	0	1	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	102					
Monday	102					
Tuesday	123					
Wednesday	100					
Thursday	89					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	27	27	6	29	40
Cumulative Solution	0	27	54	60	89	129
Integer Sum	0	27	54	60	89	129
Previous Sum	0	0	27	54	60	89
Initial Schedule	0	27	27	6	29	40
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	27	27	27	27	2
Type 3	27	0	27	27	27	2
Type 4	6	6	0	6	6	0
Type 5	29	29	29	0	29	2
Type 6	40	40	40	40	0	4
Total	102	102	123	100	89	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	7	0	7	7	7	
Type 4	6	6	0	6	6	
Type 5	9	9	9	0	9	
Type 6	0	0	0	0	0	
Total	22	22	23	20	29	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	22	22	23	20	29	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	6	6	7	4	13	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	0	2	4
Last Assignment	2	0	0	0	0	0
	2	2	2	0	2	4
Number Of Full Time						
Employees	12					

Requirements						
Sunday	108					
Monday	104					
Tuesday	95					
Wednesday	103					
Thursday	110					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	22	26	35	27	20
Cumulative Solution	0	22	48	83	110	130
Integer Sum	0	22	48	83	110	130
Previous Sum	0	0	22	48	83	110
Initial Schedule	0	22	26	35	27	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	22	22	22	22	2
Type 3	26	0	26	26	26	2
Type 4	35	35	0	35	35	3
Type 5	27	27	27	0	27	2
Type 6	20	20	20	20	0	2
Total	108	104	95	103	110	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	2	2	2	2	
Type 3	6	0	6	6	6	
Type 4	5	5	0	5	5	
Type 5	7	7	7	0	7	
Type 6	0	0	0	0	0	
Total	18	14	15	13	20	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	18	14	15	13	20	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	10	6	7	5	12	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	3	2	2
Last Assignment	1	0	0	0	0	0
	1	2	2	3	2	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	87					
Monday	97					
Tuesday	102					
Wednesday	87					
Thursday	113					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	34.5	24.5	19.5	34.5	8.5
Cumulative Solution	0	34.5	59	78.5	113	121.5
Integer Sum	0	35	59	79	113	122
Previous Sum	0	0	35	59	79	113
Initial Schedule	0	35	24	20	34	9
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	35	35	35	35	3
Type 3	24	0	24	24	24	2
Type 4	20	20	0	20	20	2
Type 5	34	34	34	0	34	3
Type 6	9	9	9	9	0	0
Total	87	98	102	88	113	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	4	0	4	4	4	
Type 4	0	0	0	0	0	
Type 5	4	4	4	0	4	
Type 6	9	9	9	9	0	
Total	17	18	22	18	13	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	17	17	22	17	13	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	9	9	14	9	5	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	2	3	0
Last Assignment	1	0	0	0	0	0
	1	3	2	2	3	0
Number Of Full Time						
Employees	11					

Requirements						
Sunday	106					
Monday	104					
Tuesday	86					
Wednesday	98					
Thursday	97					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	16.75	18.75	36.75	24.75	25.75
Cumulative Solution	0	16.75	35.5	72.25	97	122.75
Integer Sum	0	17	36	73	97	123
Previous Sum	0	0	17	36	73	97
Initial Schedule	0	17	19	37	24	26
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	17	17	17	17	1
Type 3	19	0	19	19	19	1
Type 4	37	37	0	37	37	3
Type 5	24	24	24	0	24	2
Type 6	26	26	26	26	0	2
Total	106	104	86	99	97	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	9	0	9	9	9	
Type 4	7	7	0	7	7	
Type 5	4	4	4	0	4	
Type 6	6	6	6	6	0	
Total	26	24	26	29	27	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	26	24	26	28	27	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	2	0	2	4	3	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	1	3	2	2
Last Assignment	3	0	0	0	0	0
	3	1	1	3	2	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	125					
Monday	95					
Tuesday	94					
Wednesday	113					
Thursday	100					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	6.75	36.75	37.75	18.75	31.75
Cumulative Solution	0	6.75	43.5	81.25	100	131.75
Integer Sum	0	7	44	82	100	132
Previous Sum	0	0	7	44	82	100
Initial Schedule	0	7	37	38	18	32
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	7	7	7	7	0
Type 3	37	0	37	37	37	3
Type 4	38	38	0	38	38	3
Type 5	18	18	18	0	18	1
Type 6	32	32	32	32	0	3
Total	125	95	94	114	100	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	7	0	7	7	7	
Type 4	8	8	0	8	8	
Type 5	8	8	8	0	8	
Type 6	2	2	2	2	0	
Total	25	25	24	24	30	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	25	25	24	23	30	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	9	9	8	7	14	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	0	3	3	1	3
Last Assignment	2	0	0	0	0	0
	2	0	3	3	1	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	95					
Monday	100					
Tuesday	98					
Wednesday	84					
Thursday	104					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	25.25	20.25	22.25	36.25	16.25
Cumulative Solution	0	25.25	45.5	67.75	104	120.25
Integer Sum	0	26	46	68	104	121
Previous Sum	0	0	26	46	68	104
Initial Schedule	0	26	20	22	36	17
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	26	26	26	26	2
Type 3	20	0	20	20	20	2
Type 4	22	22	0	22	22	2
Type 5	36	36	36	0	36	3
Type 6	17	17	17	17	0	1
Total	95	101	99	85	104	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	6	6	6	6	
Type 3	0	0	0	0	0	
Type 4	2	2	0	2	2	
Type 5	6	6	6	0	6	
Type 6	7	7	7	7	0	
Total	15	21	19	15	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	15	20	18	14	14	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	7	12	10	6	6	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	2	2	3	1
Last Assignment	1	0	0	0	0	0
	1	2	2	2	3	1
Number Of Full Time						
Employees	11					

Requirements						
Sunday	99					
Monday	114					
Tuesday	91					
Wednesday	100					
Thursday	91					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	24.75	9.75	32.75	23.75	32.75
Cumulative Solution	0	24.75	34.5	67.25	91	123.75
Integer Sum	0	25	35	68	91	124
Previous Sum	0	0	25	35	68	91
Initial Schedule	0	25	10	33	23	33
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	25	25	25	25	2
Type 3	10	0	10	10	10	1
Type 4	33	33	0	33	33	3
Type 5	23	23	23	0	23	2
Type 6	33	33	33	33	0	3
Total	99	114	91	101	91	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	5	5	5	5	
Type 3	0	0	0	0	0	
Type 4	3	3	0	3	3	
Type 5	3	3	3	0	3	
Type 6	3	3	3	3	0	
Total	9	14	11	11	11	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	9	14	11	10	11	Hours
Full Time Hours Assigned	1	1	1	1	1	8
Part Time Hours	1	6	3	2	3	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	3	2	3
Last Assignment	1	0	0	0	0	0
	1	2	1	3	2	3
Number Of Full Time						
Employees	12					

Requirements						
Sunday	112					
Monday	86					
Tuesday	90					
Wednesday	107					
Thursday	107					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	13.5	39.5	35.5	18.5	18.5
Cumulative Solution	0	13.5	53	88.5	107	125.5
Integer Sum	0	14	53	89	107	126
Previous Sum	0	0	14	53	89	107
Initial Schedule	0	14	39	36	18	19
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	14	14	14	14	1
Type 3	39	0	39	39	39	3
Type 4	36	36	0	36	36	3
Type 5	18	18	18	0	18	1
Type 6	19	19	19	19	0	1
Total	112	87	90	108	107	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	4	4	4	4	
Type 3	9	0	9	9	9	
Type 4	6	6	0	6	6	
Type 5	8	8	8	0	8	
Type 6	9	9	9	9	0	
Total	32	27	30	28	27	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	32	26	30	27	27	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	8	2	6	3	3	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	3	3	1	1
Last Assignment	3	0	0	0	0	0
	3	1	3	3	1	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	83					
Monday	111					
Tuesday	112					
Wednesday	81					
Thursday	104					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	39.75	11.75	10.75	41.75	18.75
Cumulative Solution	0	39.75	51.5	62.25	104	122.75
Integer Sum	0	40	52	63	104	123
Previous Sum	0	0	40	52	63	104
Initial Schedule	0	40	12	11	41	19
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	40	40	40	40	4
Type 3	12	0	12	12	12	1
Type 4	11	11	0	11	11	1
Type 5	41	41	41	0	41	4
Type 6	19	19	19	19	0	1
Total	83	111	112	82	104	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	2	0	2	2	2	
Type 4	1	1	0	1	1	
Type 5	1	1	1	0	1	
Type 6	9	9	9	9	0	
Total	13	11	12	12	4	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	13	11	12	11	4	Hours
Full Time Hours Assigned	1	1	1	1	0	10
Part Time Hours	3	1	2	1	4	
Final Assignment Type	1					
Number Last Assignment	1					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	4	1	1	4	1
Last Assignment	1	0	0	0	0	0
	1	4	1	1	4	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	89					
Monday	97					
Tuesday	106					
Wednesday	101					
Thursday	109					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	36.5	28.5	19.5	24.5	16.5
Cumulative Solution	0	36.5	65	84.5	109	125.5
Integer Sum	0	37	65	85	109	126
Previous Sum	0	0	37	65	85	109
Initial Schedule	0	37	28	20	24	17
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	37	37	37	37	3
Type 3	28	0	28	28	28	2
Type 4	20	20	0	20	20	2
Type 5	24	24	24	0	24	2
Type 6	17	17	17	17	0	1
Total	89	98	106	102	109	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	8	0	8	8	8	
Type 4	0	0	0	0	0	
Type 5	4	4	4	0	4	
Type 6	7	7	7	7	0	
Total	19	18	26	22	19	
Last Assignment						
Slack	0	1	0	1	0	
Adjusted Remaining Hours	19	17	26	21	19	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	3	1	10	5	3	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	2	2	2	1
Last Assignment	2	0	0	0	0	0
	2	3	2	2	2	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	85					
Monday	91					
Tuesday	102					
Wednesday	113					
Thursday	94					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	36.25	30.25	19.25	8.25	27.25
Cumulative Solution	0	36.25	66.5	85.75	94	121.25
Integer Sum	0	37	67	86	94	122
Previous Sum	0	0	37	67	86	94
Initial Schedule	0	37	30	19	8	28
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	37	37	37	37	3
Type 3	30	0	30	30	30	3
Type 4	19	19	0	19	19	1
Type 5	8	8	8	0	8	0
Type 6	28	28	28	28	0	2
Total	85	92	103	114	94	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	0	0	0	0	0	
Type 4	9	9	0	9	9	
Type 5	8	8	8	0	8	
Type 6	8	8	8	8	0	
Total	25	32	23	24	24	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	25	31	22	23	24	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	9	15	6	7	8	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	3	3	1	0	2
Last Assignment	2	0	0	0	0	0
	2	3	3	1	0	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	94					
Monday	98					
Tuesday	91					
Wednesday	88					
Thursday	97					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	23	19	26	29	20
Cumulative Solution	0	23	42	68	97	117
Integer Sum	0	23	42	68	97	117
Previous Sum	0	0	23	42	68	97
Initial Schedule	0	23	19	26	29	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	23	23	23	23	2
Type 3	19	0	19	19	19	1
Type 4	26	26	0	26	26	2
Type 5	29	29	29	0	29	2
Type 6	20	20	20	20	0	2
Total	94	98	91	88	97	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	9	0	9	9	9	
Type 4	6	6	0	6	6	
Type 5	9	9	9	0	9	
Type 6	0	0	0	0	0	
Total	24	18	21	18	27	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	24	18	21	18	27	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	8	2	5	2	11	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	2	2	2
Last Assignment	2	0	0	0	0	0
	2	2	1	2	2	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	108					
Monday	102					
Tuesday	83					
Wednesday	96					
Thursday	104					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	15.25	21.25	40.25	27.25	19.25
Cumulative Solution	0	15.25	36.5	76.75	104	123.25
Integer Sum	0	16	37	77	104	124
Previous Sum	0	0	16	37	77	104
Initial Schedule	0	16	21	40	27	20
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	16	16	16	16	1
Type 3	21	0	21	21	21	2
Type 4	40	40	0	40	40	4
Type 5	27	27	27	0	27	2
Type 6	20	20	20	20	0	2
Total	108	103	84	97	104	11
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	6	6	6	6	
Type 3	1	0	1	1	1	
Type 4	0	0	0	0	0	
Type 5	7	7	7	0	7	
Type 6	0	0	0	0	0	
Total	8	13	14	7	14	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	8	12	13	6	14	Hours
Full Time Hours Assigned	0	0	0	0	0	0
Part Time Hours	8	12	13	6	14	
Final Assignment Type	1					
Number Last Assignment	0					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	2	4	2	2
Last Assignment	0	0	0	0	0	0
	0	1	2	4	2	2
Number Of Full Time						
Employees	11					

Requirements						
Sunday	106					
Monday	88					
Tuesday	99					
Wednesday	100					
Thursday	108					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	19.25	37.25	26.25	25.25	17.25
Cumulative Solution	0	19.25	56.5	82.75	108	125.25
Integer Sum	0	20	57	83	108	126
Previous Sum	0	0	20	57	83	108
Initial Schedule	0	20	37	26	25	18
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	20	20	20	20	2
Type 3	37	0	37	37	37	3
Type 4	26	26	0	26	26	2
Type 5	25	25	25	0	25	2
Type 6	18	18	18	18	0	1
Total	106	89	100	101	108	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	0	0	0	0	
Type 3	7	0	7	7	7	
Type 4	6	6	0	6	6	
Type 5	5	5	5	0	5	
Type 6	8	8	8	8	0	
Total	26	19	20	21	18	
Last Assignment						
Slack	0	1	1	1	0	
Adjusted Remaining Hours	26	18	19	20	18	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	10	2	3	4	2	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	3	2	2	1
Last Assignment	2	0	0	0	0	0
	2	2	3	2	2	1
Number Of Full Time						
Employees	12					

Requirements						
Sunday	113					
Monday	99					
Tuesday	91					
Wednesday	102					
Thursday	98					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	12.75	26.75	34.75	23.75	27.75
Cumulative Solution	0	12.75	39.5	74.25	98	125.75
Integer Sum	0	13	40	75	98	126
Previous Sum	0	0	13	40	75	98
Initial Schedule	0	13	27	35	23	28
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	13	13	13	13	1
Type 3	27	0	27	27	27	2
Type 4	35	35	0	35	35	3
Type 5	23	23	23	0	23	2
Type 6	28	28	28	28	0	2
Total	113	99	91	103	98	10
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	3	3	3	3	
Type 3	7	0	7	7	7	
Type 4	5	5	0	5	5	
Type 5	3	3	3	0	3	
Type 6	8	8	8	8	0	
Total	23	19	21	23	18	
Last Assignment						
Slack	0	0	0	1	0	
Adjusted Remaining Hours	23	19	21	22	18	Hours
Full Time Hours Assigned	2	2	2	2	2	8
Part Time Hours	7	3	5	6	2	
Final Assignment Type	1					
Number Last Assignment	2					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	1	2	3	2	2
Last Assignment	2	0	0	0	0	0
	2	1	2	3	2	2
Number Of Full Time						
Employees	12					

Requirements						
Sunday	96					
Monday	107					
Tuesday	91					
Wednesday	94					
Thursday	104					
Heuristic Solution	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
LP Solution	0	27	16	32	29	19
Cumulative Solution	0	27	43	75	104	123
Integer Sum	0	27	43	75	104	123
Previous Sum	0	0	27	43	75	104
Initial Schedule	0	27	16	32	29	19
Initial Assignment	Sun	Mon	Tues	Wed	Thurs	# FT
Type 1	0	0	0	0	0	0
Type 2	0	27	27	27	27	2
Type 3	16	0	16	16	16	1
Type 4	32	32	0	32	32	3
Type 5	29	29	29	0	29	2
Type 6	19	19	19	19	0	1
Total	96	107	91	94	104	9
Remaining Hours						
Type 1	0	0	0	0	0	
Type 2	0	7	7	7	7	
Type 3	6	0	6	6	6	
Type 4	2	2	0	2	2	
Type 5	9	9	9	0	9	
Type 6	9	9	9	9	0	
Total	26	27	31	24	24	
Last Assignment						
Slack	0	0	0	0	0	
Adjusted Remaining Hours	26	27	31	24	24	Hours
Full Time Hours Assigned	3	3	3	3	3	8
Part Time Hours	2	3	7	0	0	
Final Assignment Type	1					
Number Last Assignment	3					
Final Assignment	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Initial Assignment	0	2	1	3	2	1
Last Assignment	3	0	0	0	0	0
	3	2	1	3	2	1
Number Of Full Time						
Employees	12					