Module 08 – Scheduling Problem

Exploratory Data Analysis

In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:

- *Make a table (similar to the textbook example) showing the temporary agency data*
- *Run summary statistics on the sample of Full-Time employee salaries. Record the Mean to use in our model*
- *Make a line graph showing foot traffic over the next 12 months. Call out any seasonality or trend you may see.*

	agency	beginning_	duration_of_service	monthly_salary
	The Jelly Ju	8	2	12492
	Tootie Frui	9	2	9946
	Chewtopia	11	2	11390
	Magic Mur	6	3	11659
	The Sprink	3	3	9612
	Taffy & Tal	1	3	10178

Average was 8415.003

Model Formulation

Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints.

MIN:

24984X+19892X+22780X+34977X+28836X+30534X+100980.036X

CONSTRAINTS:

Month 1: 0X1+0X2+0X3+0X4+0X5+1X6+1X7=269
Month 2: 0X1+0X2+0X3+0X4+0X5+1X6+1X7=368
Month 3: 0X1+0X2+0X3+0X4+1X5+1X6+1X7=509
Month 4: 0X1+0X2+0X3+0X4+1X5+0X6+1X7=569
Month 5: 0X1+0X2+0X3+0X4+1X5+0X6+1X7=499
Month 6: 0X1+0X2+0X3+1X4+0X5+0X6+1X7=368
Month 7: 0X1+0X2+0X3+1X4+0X5+0X6+1X7=307
Month 8: 1X1+0X2+0X3+1X4+0X5+0X6+1X7=387
Month 9: 1X1+1X2+0X3+0X4+0X5+0X6+1X7=549
Month 10: 0X1+1X2+0X3+0X4+0X5+0X6+1X7=656
Month 11: 0X1+0X2+1X3+0X4+0X5+0X6+1X7=613
Month 12: 0X1+0X2+1X3+0X4+0X5+0X6+1X7=465

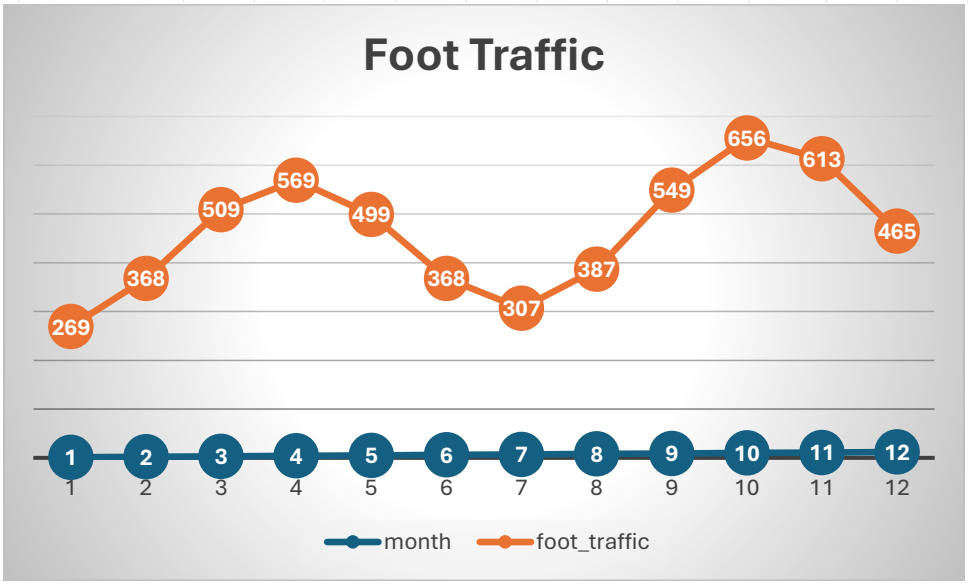
Model Optimized for Min Costs to Cover Store Foot Traffic

Implement your formulation into Excel and be sure to make it neat. This section should include:

- *A screenshot of your optimized final model (formatted nicely, of course)*

- *A text explanation of what your model is recommending*

	January	February	March	April	May	June	July	August	September	October	November	December	Scheduled	Wages
The Jelly Jubilee	0	0	0	0	0	0	0	1	1	0	0	0	0	24984
Tootie Fruity Trading Co.	0	0	0	0	0	0	0	0	1	1	0	0	288	19892
Chewtopia	0	0	0	0	0	0	0	0	0	0	1	1	245	22780
Magic Munchies	0	0	0	0	0	1	1	1	0	0	0	0	19	34977
The Sprinkle Syndicate	0	0	1	1	1	0	0	0	0	0	0	0	201	28836
Taffy & Tales	1	1	1	0	0	0	0	0	0	0	0	0	0	30534
Full Time	1	1	1	1	1	1	1	1	1	1	1	1	368	100980.036
Available	368	368	569	569	569	387	387	387	656	656	613	613		
Required	269	368	509	569	499	368	307	387	549	656	613	465	Total-->	$54,931,248.25



The model is recommending to minimize unnecessary staffing to minimize costs. So only schedule certain agencies when necessary, as well as full time workers.

Model with Stipulation

Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution.

Please do both of the following:

1. *Unfortunately, leadership wishes to have a reduction in workforce. While the monthly salary for full time employees is cheaper than temporary workers, there are other costs associated with full time employees that they wish to cut. Add a constraint to your model that takes your first model's recommended number of full-time employees and constrains it to be only 80% of it. Add a text explanation of the change in the optimal value as well as any other changes noticed between the models.*

   It brought up the total by about a million. This makes it more expensive, but not nearly as expensive as moving to strictly full time.

2. *Alternatively, leadership would like to see what the average monthly salary for an employee would need to be to cut out all temporary workers as they believe that will help negate excess spending. Convert your model (or do the math out yourself) to figure out what monthly salary you would need to pay your full-time employees to only have full-time workers at the same optimal cost as the original model.* **$9,769,818.48**

3. *Considering trends and seasonality of this business, what would you recommend leadership to do? Feel free to play with the model and recommend something else.*

   I would recommend leadership keeps the scheduling as is, because it is the cheapest option I have seen throughout all of the spreadsheets.