Assignment Instructions: Module 11 - Integer Programming

Purpose

The purpose of this assignment is to formulate and solve an integer programming problem. In addition, this will help you master the following module outcomes:

- Identify models that satisfy the Integer Programming (IP) model assumptions.
- Examine the solution approach to solving IP problems.
- Formulate an IP Model.
- Solve IP models.

Directions

AP is a shipping service that guarantees overnight delivery of packages in the continental US. The company has various hubs at major cities and airports across the country. Packages are received at hubs, and then shipped to intermediate hubs or to their final destination.

The manager of the AP hub in Cleveland is concerned about labor costs, and is interested in determining the most effective way to schedule workers. The hub operates seven days a week, and the number of packages it handles varies from one day to another. The table below provides an estimate of the number of workers needed each day of the week.

Day of the Week	**Workers Required**
Sunday	18
Monday	27
Tuesday	22
Wednesday	26
Thursday	25
Friday	21
Saturday	19

Package handlers at AP are guaranteed a five-day work week with two consecutive days off. The base wage for the handlers is $750 per week. Workers working on Saturday or Sunday receive an additional $25 per day. The possible shifts and salaries for package handlers are:

Shift	**Days Off**	**Wage**
1	Sunday and Monday	$775

2	Monday and Tuesday	$800
3	Tuesday and Wednesday	$800
4	Wednesday and Thursday	$800
5	Thursday and Friday	$800
6	Friday and Saturday	$775
7	Saturday and Sunday	$750

Questions

The manager wants to keep the total wage expenses as low as possible while ensuring that there are sufficient number of workers available each day. Formulate and solve the problem. What was the total cost? How many workers are available each day?

Hint: The number of available workers each day can exceed, but can not be below the required amount.

Requirements

All due dates are included in the Assignment Schedule.

General Submission Instructions

All work must be your own. Copying other people's work or from the Internet is a form of plagiarism and will be prosecuted as such.

Upload an R markdown file, along with any required .lp files to your git repository. Name your file Username_#.ext, where Username is your Kent State User ID (the part before @), and # is the Assignment number.

Provide the link to your git repository in Blackboard Learn for the assignment.