

Homework #8

This is an individual assignment. All work that you submit for credit must be your own.

1. Twenty-eight graduate students in a case study consulting course must be assigned to work together in a team of four students on one of seven projects. Each student is assigned to a single project, and each project must be assigned four students. The students in the course have been surveyed to indicate their level of preference/interest for each of the projects with 5 indicating a strong preference for a project and 1 indicating a low preference. The student-project preference data is provided in the file HW8_data.ipynb. Construct an optimization model for this problem in a Jupyter Notebook, and use it to find an optimal solution.

Choose one of the questions below to answer.

2. Premier Consulting's two consultants, Avery and Baker, can be scheduled to work for clients up to a maximum of 160 hours each over the next four weeks. A third consultant, Campbell, has some administrative assignments already planned and is available for clients up to a maximum of 140 hours over the next four weeks. The company has four clients with projects in process. The estimated hourly requirements for each of the clients over the four-week period are as follows: Hourly rates vary for the consultant–client combination and are based on several factors, including project type and the consultant's experience. The rates (dollars per hour) for each consultant–client combination are as follows:

Client	A	B	C	D
Hour	180	75	100	85

Hourly rates vary for the consultant–client combination and are based on several factors, including project type and the consultant's experience. The rates (dollars per hour) for each consultant–client combination are as follows:

Consultant	Client			
	A	B	C	D
Avery	100	125	115	100
Baker	120	135	115	120
Cambell	155	150	140	130

- a. Formulate the problem as a linear program in a Jupyter Notebook, with the optimal solution providing the hours each consultant should

be scheduled for each client to maximize the consulting firm's billings. What is the schedule and what is the total billing?

- b. New information shows that Avery doesn't have the experience to be scheduled for client B. If this consulting assignment is not permitted, what impact does it have on total billings? What is the revised schedule?

3. Tri-County Utilities supplies natural gas to customers in a three county area. The company purchases natural gas from two suppliers: Southern Gas and Northwest Gas. Demand forecasts for the coming winter season are as follows: Hamilton County 400 units, Butler County 200 units, and Clermont County 300 units. Tri-County Utilities has contracted with Southern Gas to provide 500 units and with Northwest Gas to provide 400 units. The distribution cost per unit from each supplier to each county are given in the table below.

Supplier	County		
	Hamilton	Butler	Clermont
Southern Gas	10	20	15
Northwest Gas	12	15	18

- a. Construct an optimization model for this problem in a Jupyter Notebook, and use it to find an optimal solution.
- b. Recent growth in Butler County has the potential to increase demand in that county by 100 units. With which supplier should Tri-County contract to provide the additional gas to meet this increased demand?