

Econ 172A, W2002: Homework 3 (Due: March 14, 2002 in class)

1. Xexotic Auditors (formerly Anderson Arthur) employs three auditors. Each can work up to 160 hours during the next month. Three projects must be completed. Project 1 takes 130 hours, project 2 takes 140 hours, and project 3 takes 160 hours. The amount that xexotic can charge for each assignment depends on the experience the auditor has on the job she is assigned to do. The table below describes the hourly earnings from each possible assignment of auditor to job. Auditors can work on different jobs over the month as long as they do not exceed 160. Xexotic earns nothing unless a job is completed.

	Project 1	Project 2	Project 3
Auditor 1	\$120	\$150	\$190
Auditor 2	\$140	\$130	\$120
Auditor 3	\$180	\$160	\$170

Auditing Charges

- (a) Assume that Xexotic's auditors do not get paid for working more than the time needed to complete a project. Assume also that any unassigned auditing time earns nothing. Find the assignment of auditors to projects that maximizes total earnings (subject to the constraints that auditors work no more than 160 hours and each project is completed).
- (b) Auditor 2's brother gets elected President. This enables Xexotic to double the rates at which it bills Auditor 2's time. How does this change your answer to part (a)?
- (c) Xexotic decides that it can double all of its charges. How does this change the answer to part (a)?
- (d) Assume that Xexotic's auditors do not get paid for working more than the time needed to complete a project. Assume that Xexotic can charge \$40 per hour for any available time of Auditor 1; \$60 per hour for any available time of Auditor 2; and \$50 per hour for any available time of Auditor 3. Find the profit maximizing way to schedule the auditors.

2. A long time ago my wife was my girl friend. She had a job in Madison, Wisconsin. We tried to see each other regularly. One month I was able to make four trips from San Diego to Madison to be with her. The table below describes my travel schedule.

Leave San Diego	Leave Madison
Monday, November 1	Friday, November 5
Tuesday, November 9	Thursday, November 11
Monday, November 15	Friday, November 19
Wednesday, November 24	Thursday, November 25

Joel's Travel Plans

I needed to buy four round-trip tickets to visit Madison. Undiscounted fare between Madison and San Diego was \$500. Any round-trip that stayed over a Saturday night sells for \$400. If the trip lasts more than 10 days, the round-trip fare is \$350. If the trip lasts more than 21 days, the round-trip fare is \$325. Find the way to minimize the total cost of purchasing the four round-trip tickets.¹

Suppose instead that my wife decides to buy two of the round-trip tickets and fly to San Diego to see me. So, we went still plan to be together Nov. 1-5, 9-11, 15-19, and 24-25, but two of these visits would take place in Madison and two in San Diego. Assuming that we planned our visits to minimize expenditure, would this cause the total amount that we spend on airfare to increase, decrease, or stay the same?

3. The table below gives costs for an assignment problem. Solve the cost minimization and cost maximization problems using Excel and the Hungarian method. (This means that you must solve two different problems and solve both of them two different ways.) Clearly indicate the optimal assignments and value.

	1	2	3	4	5	6
<i>A</i>	8	7	6	8	10	110
<i>B</i>	6	5	7	9	9	110
<i>C</i>	8	5	9	10	2	120
<i>D</i>	4	6	3	7	8	75
<i>E</i>	9	5	9	7	4	125
<i>F</i>	8	4	6	8	5	110

¹We eventually decided that it was unpatriotic to fly on Thanksgiving. She got a job in San Diego, we got married, and I haven't been to Madison in nine years.