

Econ 172A, Fall 2004: Problem Set 3

Due: December 2, 2004, in class (no late papers)

1. (a) A small office consists of four people, each of whom must do one (and only one) job. An expert at assessing skills figured out how long it would take any individual to do any job. The relevant information is in the table below. For example, it will take Ann 574 minutes to do the public relations, while it would take Dave 690 minutes to do administration. Find the assignment of people to jobs that minimizes the total time needed to do all four jobs.

<i>Person</i>	<i>Clerical</i>	<i>PublicRelations</i>	<i>Accounting</i>	<i>Administration</i>
<i>Ann</i>	490	574	378	560
<i>Bob</i>	564	540	384	612
<i>Cindy</i>	507	728	468	559
<i>Dave</i>	480	765	375	690

- (b) Suppose that Dave is replaced by his younger brother Dan, who takes an extra 15 minutes to do whatever task he is assigned to do. How does this change the solution?
- (c) Suppose that there is an extra clerical job that will take 30 minutes to do no matter who is assigned to it. How does this change the solution?
- (d) Suppose that Ann is replaced by her older sister, Alice, who can do everything twice as fast as Ann. How does this change the solution?
2. For the following two-person, zero-sum games, find the value and the equilibrium strategies.

(a)

5	2
0	4

(b)

5	10	2
4	1	3

(c)

5	2	0
0	4	5

3. Consider the two-player zero-sum game:

5	10	5	10
6	3	10	15
15	5	8	10
8	15	7	2

- (a) Find the equilibrium strategies and the value. (You could do this by hand, but I would prefer if you tried to get the answer using Excel.)
- (b) How does the answer change if all the entries in the payoff matrix doubled?
- (c) How does the answer change if all the entries in the payoff matrix increased by 5?
- (d) How does the answer change if the I increased all entries in the top row by no more than 2 (but different entries increased by different amounts)?
- (e) How does the answer change if the I increased all entries in the second row by no more than 2 (but different entries increased by different amounts)?
- (f) To what extent are the answers to parts (b)-(d) general? Explain.
- (g) Suppose we add a strategy to the game that guarantees Row a payoff of K (and so column loses K no matter what she does). Find the solution of the game for all values of K .

You can obtain answers to parts (b) and (c) (and get some intuition on (d)) by solving variations of the original problem using Excel.