Professor Joyce Jacobsen

Economics 301-1
Fall Semester 2006-07

Assignment #9

Due Monday 12/4/06 by 6 p.m. in the Econ 301-1 slot in the Economics Alcove

Please show the calculations used to arrive at your answers. Draw graphs neatly and label axes and points clearly. In general, leave numbers in fractional form while solving problems. Round final answers to the first decimal place if necessary.

A. Two prisoners, Brian and Napat, are being interrogated. Each is told that if they confess to running a campus center cup theft ring, they will be expelled for one semester. If one person does not confess, but the other person does, then the one who does not confess will be expelled for three semesters. If neither confesses, they will both go free. Assume that expulsion leads to a loss of utility for both persons.

(1) a. Set up the payoff matrix that describes this prisoners' dilemma.

b. Are there any Nash equilibria in this game?

c. Is there an equilibrium in dominant strategies?

d. Explain what a minimax strategy is. If both players use the minimax strategy, where will they end up?

(2) Now assume Brian gets to either confess or deny first, and then Napat gets to choose what to do after being told what Brian has done.

a. Has the payoff matrix changed?

b. Write down the game in extensive form.

c. Now where will the players end up?

d. Would your answer to c. change if Napat went first?

(3) A new interrogator comes in and changes the rules of the game: If Napat confesses, he gets off free. The other rules stay the same as for (1).

a. Write down the new payoff matrix.

b. Are there any Nash equilibria in this game?

c. Is there an equilibrium in dominant strategies?

d. Would the game end up differently if Brian went first and Napat were told what she had chosen before he decided what to do?

(4) The new interrogator changes the rules again: Now if both confess, they get off free. Otherwise, the rules are the same as for (1).

a. Write down the new payoff matrix.

b. Are there any Nash equilibria in this game?

c. Is there an equilibrium in dominant strategies?

d. What kind of strategy should each person pursue in this game?

B. There are two kinds of workers, who exist in equal numbers. One kind has a constant marginal product of 10 and the other kind has a constant marginal product of 15. The labor market is competitive.

(1) A firm cannot tell one kind from the other, even after hiring. What wage will it pay?

(2) Suppose that Prof. Bernanke at a local university offers a night course in intermediate microeconomics, Econ 3001. The high-productivity workers think that taking his course is just as bad as a $3 wage cut, and the low-productivity workers think taking the course is just as bad as a $6 wage cut. The firm knows this, and also can observe who takes the course.

a. What will the firm set the wage to be for people who take the course? What about for people who don't take the course?

b. What is the net benefit of taking the course for the high-productivity workers? What about for the low-productivity workers?

c. Will there be a pooling or a separating equilibrium?

(3) Prof. Bernanke is summoned to Washington to run the Fed, and Prof. Klump takes over the job of teaching Econ 3001. He is more entertaining. The high-productivity workers think that taking his course is only as bad as a $1 wage cut, and the low-productivity workers think it is only as bad as a $4 wage cut.

a. If the wages are set as in (2)a., what is the net benefit of taking the course for the high- productivity workers? What about for the low-productivity workers?

b. Will there be a pooling or a separating equilibrium?

(4) Which is the more efficient outcome, (2)c. or (3)b.? Explain.

C. For each of the following questions, come up with an <u>original</u> (i.e., not from the book or from class notes, and not the same as anyone else's) example from real life to illustrate the concept.

(1) Give an example of a market that exhibits switching costs.

(2) Give an example of a market that exhibits network externalities.

D. There are two persons, A and B, and two goods, 1 and 2.

Person A's utility function is $U_A(X_A^1, X_A^2) = X_A^1 + 2X_A^2$, and B's is $U_B(X_B^1, X_B^2) = 2X_B^1 + X_B^2$.

(1) a. Draw an Edgeworth box if $(W_A^1 + W_B^1) = (W_A^2 + W_B^2) = 8$. Which point is B's preferred point? Which is A's?

b. If A's endowment is $W_A^1 = 8$, $W_A^2 = 1$, mark endowment point W.

(2) a. Draw the indifference curves that go through W and indicate the set of feasible allocations.

b. Given W, what Pareto-optimal allocation would A choose? What would B choose?

(3) a. Show which points lie on the contract curve.

b. Show which points on the contract curve are in the set of feasible allocations.

(4) a. If $P_1 = 1$ and $P_2 = 1$, draw the budget line through W.

b. Show the market equilibrium X and the related indifference curves.

(5) Does this picture illustrate a violation of the Second Welfare Theorem? Explain why or why not.