Econ 302: Microeconomics II - Strategic Behavior

Final Exam – August 12, 2012
3:30– 5:30 in B 9200

1. **(10 points)** True/False/Uncertain? Explain your answer briefly.

   a) A strictly dominated strategy can never be a best response.

   b) If Sally's privately optimal amount of the public good is 5 units, and Harry's privately optimal amount of the public good is 10 units, then the Pareto optimal amount of the public good must be 15 units.

   c) One benefit of a compulsory, publicly funded, health insurance system like Canada's is that it mitigates the problem of moral hazard.

2. **(7 points)** A professor has a final to give to her Econ 302 class. She can decide whether to make the final difficult or easy. The students can decide whether to study hard or be lazy. Assume they make these decisions simultaneously, i.e., the professor doesn't know whether the students worked hard or not, and the students don't know whether the exam will be difficult or easy. The student prefers to slack off rather than studying hard, provided the exam is easy. The professor would like her students to work hard, but prefers them to pass, other things equal. The payoff-matrix is:

		Student	
		Study Hard	Be Lazy
Professor	Difficult	$4, 3$	$0, -2$
	Easy	$3, 3$	$1, 6$

The Exam Game

   a) Determine all pure strategy Nash equilibria of this game. Briefly show how you arrived at your answer.

   b) Determine the mixed strategy Nash equilibrium of this game. Calculate the probability that the student fails the class, which happens if he is lazy and the professor gives a difficult exam.

3. **(9 points)** Reconsider the Exam Game of Question 2, but now suppose that the players move sequentially: The student moves first, and then the professor (observing what the student did) makes his choice.

   a) Draw the game tree of the sequential game. Write down <u>all</u> possible strategies for each player.

b) Determine the unique Subgame Perfect equilibrium of the game. Compare this equilibrium to 2. a) and give an intuition for the difference in possible outcomes, carefully explaining which strategies are no longer credible.

c) Consider the outcome where the professor gives a difficult exam and the student studies hard. Can this outcome still be supported as a Nash equilibrium of the sequential game? Why or why not?

4. **(12 points)** Sally considers a career in real estate. If she invested \$10,000 in a real estate licence, Sally figures she could make \$ 50,000 if the market is 'bullish' and \$ 24,400 if the market is 'bearish'. There is a 20 percent chance that the market is 'bullish' and Vancouver housing prices will go up. Sally's current job earns her a fixed salary of \$ 22,500. Her utility function is $v(y) = \sqrt{y}$.

   a) Show that Sally will go into real estate if she is an expected utility maximizer.

   b) Her current employer wants to keep Sally. How much of a salary raise would they have to give Sally in order for her to reconsider her decision?

   c) Harry, a friend, offers Sally insurance: if she pays him x dollars now, then, in the event the market is 'bearish', he will pay her the difference in earnings had housing prices gone up, i.e., \$ 25,600. If the market is 'bullish', he pays nothing. What is the maximum value of x that Sally is willing to pay for such an insurance? Assuming Harry is risk neutral, will he gain from his offer? Explain!

5. **(12 points)**. Newly single dad Tom Cruise needs to hire a nanny for his spoiled daughter. There are two types of nannies: good nannies, who are loving & energetic ($i = G$), and bad nannies who are draconian & lazy ($i = B$). The value of their productivity a_i (monetary equivalent his daughter's happiness) and the relative frequency of each group is

	$i = B$	$i = G$
rel. frequency f_i	$\frac{2}{3}$	$\frac{1}{3}$
a_i(in \$/$hour$)	9	15

   The labor market is competitive, so Tom must offer a nanny the (expected) value of her productivity.

   a) Suppose nannies know their type but Tom does not. He only knows the relative frequencies of either type in the population. Based on that information, what wage would he offer? Assuming that in alternative employment opportunities, good nannies would earn \$ 12 and bad nannies would earn \$ 4, who would want to work for Tom?

b) What type of nannies will Tom necessarily hire in equilibrium and what will their wages be? Is this equilibrium Pareto efficient? Give an intuition of your finding!

c) Sally is an applicant (of unknown type). Tom thinks about hiring her on a probationary basis for one period some wage w_1 and – provided her productivity during the probationary period was at least $a_G = 15$ – to continue employing her for a second period at some wage w_2. Assuming Sally (and Tom) only cares about the wage sum in both periods, $w_1 + w_2$, is it possible to choose the values of w_1 and w_2 so as to only make the job attractive only to good nannies? Discuss!