FINAL EXAM, ECON302 (YELLOW) May 9, 2007

Name:

E-mail: *@uiuc.edu*

All questions must be answered on this test form!
For each question you must show your work and (or) provide a clear argument.
Write you answers in the boxes.
For scratch paper use the back of the form or the last page.

Question 1 Recall the matching-pennies game from class. We showed that in equilibrium each player chooses heads and tails with probability 0.5 and that the expected payoff of each player is zero. Now suppose instead that player A receives a payoff of 7 Dollars if both players select H. Thus, the payoff matrix is

		B: H	B: T
A	H	7,−1	−1,1
	T	−1,1	1,−1

Then *10 points*

Player *A*'s expected payoff is

Question 2 The following example was originally suggested by the French philosopher, Jean Jacques Rousseau. There are two hunters (denote them by A and B), each of whom can decide whether to hunt for stag or for rabbit. Since the stag is bigger and has more meat, the total benefit to both hunters is much higher if they get one stag than if each gets a rabbit. However, the stag hunt is only successful if they both pursue it together.

The payoff matrix is given by

		B: stag	B: rabbit
A	stag	6,6	0,5
	rabbit	5,0	3,3

(a) Then pure strategy Nash equilibria *5 points*

exist **do not exist** (*Mark the correct answer)*)

If pure strategy equilibria exist, then mark which ones are equilibria (the first strategy listed is that of player A.

Stag, Stag **Stag, Rabbit** **Rabbit, Stag** **Rabbit, Rabbit**

(b) Determine the mixed strategy equilibrium of this game *10 points*

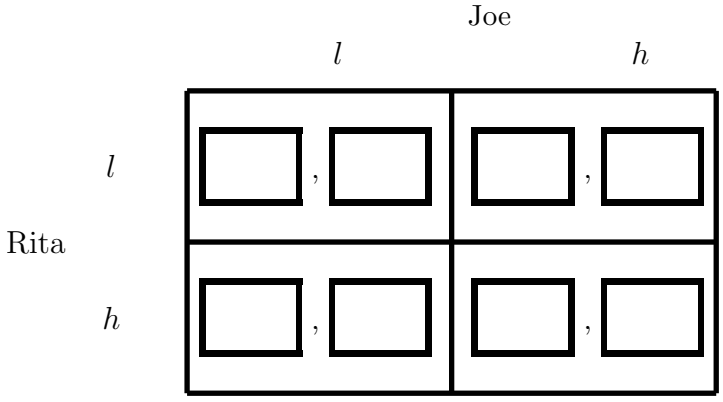
In the mixed strategy equilibrium player A will hunt the stag with probability [ ]

PIayer B will hunt the stag with probability [ ]

Question 3 Rita and Joe are working on a joint project for a class. Each of them can choose how much effort to put in the project. Suppose there are just two choices, high effort, h, and low effort l. The students are graded on the result of the final project but not on how much effort to put in. Since Rita received a better grade on the exams than Joe, she would receive an A as final grade if at least one of them spends the high effort on the project. Joe will receive an A only if both spend high effort, and he receives a B otherwise.

Suppose that a student's benefit from getting an A is 25 and from a B is 10. Suppose that the cost of the low effort is 0 and the cost of the high effort is 5. The payoff is the benefit minus the cost (e.g., the payoff from an A if you choose high effort is $25 - 5 = 20$). *15 points*

Specify the payoff matrix by filling in the numbers below:



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In the mixed strategy equilibrium:

Rita chooses low effort with probability

Joe chooses low effort with probability

Rita gets an A with probability and a B with probability .

Joe gets an A with probability and a B with probability .

Question 4 Suppose that are two types of consumers that seek health insurance: High risk and low risk. A high-risk consumer will get sick and need care that costs \$100,000 with probability 0.4. For a low risk consumers the cost is also \$100,000 but the probability is 0.02. Both types have an income of \$120,000. Suppose that 95% of the population is low risk and 5% is high risk. Consumers can either choose to be fully insured, or they can choose to be uninsured. Bernoulli utility is $\ln(x)$.

(a) Then a low-risk consumer's maximum willingness to pay for insurance is ☐ *10 points*

A high-risk consumer's maximum willingness to pay for insurance is ☐

Suppose that the insurance company cannot distinguish the two types and offers them insurance at the same premium. The price at which the insurance company would break even if it insures both high and low risk consumers is ☐

At this price ☐ **only high risk** ☐ **only low risk** ☐ **both types** (*Mark the correct answer*) will be insured).

(b) Now suppose that the insurance company is informed about "pre-existing conditions." Suppose that if a person has a pre-existing condition then the person is high risk with probability 1. If a person does not have a pre-existing condition then he is low risk with probability 0.99 and high-risk with probability 0.01.

Suppose that the insurance company offers rates at which it expects to break even. Then the premium charged to a person with a pre-existing condition is ☐ *5 points*

Then the premium charged to a person without a pre-existing condition is ☐

Question 5 The price elasticity of demand for a firm's product is -1.5. The firm's cost function is $c(y) = 10y$.

(a) If the firm maximizes profits, *5 points*

the firm charges a price $p =$

the firm's profit/unit is

(b) Now suppose that because of increased competition by other firms, the price elasticity changes to -3. Then *5 points*

the firm charges a price $p =$

the firm's profit/unit is

Question 6 The profit of a firm is given by $f(e) = 100e - e^2$, where e is the manager's effort. The manager's cost of effort is given by $c(e) = 2e$. The manager receives a share s of the firm's profit as compensation, i.e., the compensation is $sf(e)$. Including the cost of effort, the manager's net-payoff is $sf(e) - c(e)$. The owner of the firm receives $f(e)$ minus the payment to manager, i.e., $f(e) - sf(e)$. Currently the manager receives a share $s = 0.05$ of the firm's profit. However, the owner is not satisfied with the manager's effort and the firm's profit and considers increasing the manager's compensation to $s = 0.1$. *10 points*

If $s = 0.05$, the owner's payoff is

If $s = 0.1$, the owner's payoff is

Question 7 The demand function for a firm's product is given by $D(p) = 10 - 0.1p$. The firm's cost function is $c(y) = 100 + 20y$. Then *10 points*

The profit maximizing price is

The firm sells **units**

The firm's profit is

Question 8 (a) A firm has a cost function $c(y) = 5,000 + 20y$. The demand for the firm's product is $D(p) = 1,000 - 10p$. This demand function would arise if there are 100 consumers that all have the same preferences $u(Q, m) = 100Q - 5Q^2 + m$, where $Q = y/100$ is an individual's consumption of the firm's output (y is the amount sold to all 100 costumers, so each receives $y/100$), and m is money spent on all other goods. Suppose each person's income is $I = 10,000$. Then *7 points*

The firm will charge a price $p =$

The firm's profit is

A consumer's utility is

(*Note:* m is the amount of money a consumer has left after purchasing $Q = y/100$ units of the firm's product).

(b) Now suppose that the government introduces a tax of 10 Dollars per unit on the firm. Thus, costs are now $c(y) = 5,000 + 30y$ (the demand function and utility function remain the same). Then *8 points*

The firm will charge a price $p =$

The firm's profit is now

The government's total tax revenue is

A consumer's utility is

If we add the change of utility (times 100, i.e., the number of consumers), the firm's change in profit, and the tax revenue then we get the dead weight loss of the tax (be careful not to forget the positive or negative sign of the change).

The dead weight loss generated by the tax is

Thus, for each Dollar of taxes raised, the loss is cents

Scratch Paper, not graded!