Microeconomics
Microeconomics C30.0001
Final Examination Spring 2011
Professors Collard-Wexler and Skreta

Name + ID: ________________________________
Skreta 9:30 □  Collard-Wexler 9:30 □
Skreta 11:00 □  Collard-Wexler 2:00 □
Skreta 3:30 □

Instructions: You are NOT allowed to use a calculator. The use of class notes, textbooks is not permitted. Please write legibly. Read the questions carefully and provide concise but justified answers. You have 1 hour and 40 minutes. Always label your axis and curves. SHOW ALL YOUR WORK. KEEP PAGES STAPLED TOGETHER! Good Luck!
1. [3pts.] The price elasticity of demand for gasoline is -2. If the government wants to reduce gasoline consumption by 20% how much should it increase the price of gasoline?

2. [3pts.] The cross-price elasticity of good \( x \) as a consequence of an increase in the price of good \( y \) is -0.5. Are goods \( x \) and \( y \) substitutes or complements?

3. [3pts.] What is the difference between the concept of returns to scale and the one of economies of scale?
4. [3pts.] In the following game identify the Nash Equilibria.

<table>
<thead>
<tr>
<th></th>
<th>work</th>
<th>shirk</th>
</tr>
</thead>
<tbody>
<tr>
<td>work</td>
<td>1, 1</td>
<td>-1, 2</td>
</tr>
<tr>
<td>shirk</td>
<td>2, -1</td>
<td>0, 0</td>
</tr>
</tbody>
</table>

Do you notice anything disturbing about this equilibrium?

5. [3pts.] Suppose that 2 identical firms produce the same good at marginal cost $c$ and they compete a la Bertrand. Draw the best response of Firm 1.

6. [3pts.] When do we say that a firm has market power? Can you name two sources of market power?

7. [3pts.] State the 3 main reasons for why competitive markets may be inefficient.
8. [3pts.] Using a diagram, show that a risk-loving individual is someone who prefers a risky income over a certain income with the same expected value.

9. [3pts.] Male peacocks are known to have particularly beautiful and colorful tails, which are critical in attracting a female mate. What would be a reason for the evolution of these very costly, and useless, tails?

10. [3pts.] An insurance company wants to insure houses against avalanche risk in the mountains. It looks at historical data and finds that every year 5% of houses are destroyed by avalanches. Give two reasons why the number of insured houses destroyed by avalanches could be higher than 5%.

11. [3pts.] Suppose that the price elasticity of demand for Mercedes in Germany is -2 and -3 in the U.K., while the marginal cost of these cars is $20,000. How will prices differ in Germany and the U.K?
12. [3pts.] The government in Indonesia subsidizes gasoline purchases so that a gallon of gasoline in Indonesia is much cheaper than in the U.S.. What is the effect of this subsidy on social welfare?

13. [4pts.]

<table>
<thead>
<tr>
<th></th>
<th>Ann/Bob</th>
<th>Sushi</th>
<th>BBQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sushi</td>
<td>5, 1</td>
<td>0, 0</td>
<td></td>
</tr>
<tr>
<td>BBQ</td>
<td>0, 0</td>
<td>2, 4</td>
<td></td>
</tr>
</tbody>
</table>

Which strategy pairs amount to Nash Equilibria in **PURE** strategies? Which strategy pair amounts to Nash Equilibrium in **MIXED** strategies?
The market demand function for gelato in Summersville is

\[ Q^d = 70 - \frac{P}{2} \]

Its cost function for producing gelato is \( TC = 5 + 20Q \).

1. [3pts.] What is fixed cost, the variable costs, average costs and marginal costs of producing gelato? Does the cost function of gelato have economies or diseconomies of scale?

2. [5pts.] Suppose that there is only ONE producer of bathing suits. Find the profit-maximizing quantity and price for bathing suits.
3. [6pts.] Suppose that the firm can perfectly price discriminate (first degree price discrimination). How much will it produce? How much will its profits be?
4. [8pts.] What will be the equilibrium prices and quantities, if there are TWO identical firms (same costs) that choose quantities simultaneously? (Cournot Competition).
5. [8pts.] Now assume that the first firm gets to choose quantity before the entrant. What are the quantities that these firms will produce and what is the price in the market? (Stackelberg Competition) Why are these quantities different?
CEO Compensation

Netflix has the following probability distribution of profits:

<table>
<thead>
<tr>
<th>Low Demand</th>
<th>High Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000</td>
<td>$400,000</td>
</tr>
</tbody>
</table>

There is a 50% probability that demand will be low, and a 50% probability that demand will be high.

The following compensation package is offered to the CEO of Netflix.

- Package A: Flat Compensation of $24,025.
- Package B: High Powered Compensation of 10% of profits.

The CEO has a utility function with respect to wealth given by:

\[ U(W) = \sqrt{W} \]

**Hint:** Since there are a lot of square roots here, I can tell you \( \sqrt{10,000} = 100 \), \( \sqrt{24,025} = 155 \), \( \sqrt{400} = 20 \), \( \sqrt{40,000} = 200 \), and \( \sqrt{62,500} = 250 \).

1. [4pts.] Which package will the CEO prefer and why?

2. [3pts.] Suppose instead that the CEO had a utility function of \( U = W \). Which package would she prefer then?
3. [3pts.] Why do these two utility functions lead to differing choices?

4. [10pts.] Now let’s suppose that effort on the part of the CEO can change the outcome of the firm. Specifically, suppose that the firm’s profits are now given by:

<table>
<thead>
<tr>
<th>Demand</th>
<th>Low Effort ($e = 0$)</th>
<th>High Effort ($e = 1$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Demand</td>
<td>100,000</td>
<td>400,000</td>
</tr>
<tr>
<td>High Demand</td>
<td>400,000</td>
<td>625,000</td>
</tr>
</tbody>
</table>

However, the CEO has a cost of effort of 50 if high effort is exerted (zero if low effort is exerted). The utility function is

$$U(W) = \sqrt{W} - 50 \cdot e.$$ 

Which package will the CEO choose and why?
Now suppose that there are two CEO’s (like at Google) named A and B, with the same utility function:

\[ U(W) = \sqrt{W} - 50 \cdot e. \]

Everything is the same except the firm’s outcome now depends on the effort of both CEO’s.

<table>
<thead>
<tr>
<th>Low Effort ((e_A = 0, e_B = 0))</th>
<th>Low Demand</th>
<th>High Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Effort (only one CEO exerts effort)</td>
<td>144,000</td>
<td>625,000</td>
</tr>
<tr>
<td>High Effort for both CEO’s ((e_A = 1, e_B = 1))</td>
<td>400,000</td>
<td>625,000</td>
</tr>
</tbody>
</table>

The rule is that they BOTH have to agree on whether to take Package A or Package B. CEO’s choose efforts simultaneously and independently from one another.

5. [2pts.] What is the expected utility if they choose Package A?
6. [8pts.] What is the expected utility if they choose Package B? Which package will the CEO’s choose?