DO NOT BEGIN WORKING
UNTIL THE INSTRUCTOR TELLS YOU TO DO SO.
READ THESE INSTRUCTIONS FIRST.

1. Please read and sign the following statement: "In keeping with the Georgetown Honor System, I assure that this exam is the product of my own work, that I will not make use of unauthorized resources or collaborate with any other student."

   (signature) _________________________________

2. Please write your name and GU ID carefully and legibly at the top of this page.

3. IMPORTANT: Please fill out a ParScore sheet follows.

   • Under “ID NUMBER” fill out your GU ID number and corresponding bubbles, right-justified.
   • Write your name and shade the appropriate bubbles.
   • Under “CODE” enter “AA” for the 12:30 exam, “BB” for the 2pm exam.
   • Under “TEST FORM” shade in the letter corresponding to the Version at the top right of this page.
   • Under “SUBJ Score” fill in the number at the top left of this page.

4. You have 1 hour to complete the exam, which consists of

    I. 5 short questions (30 points)
    II. 20 multiple-choice questions (30 points)

    The exam is worth 60 points, so allocate your time accordingly.

5. You may refer to one 3x5 card with your written notes and use a calculator, but you may not use any other notes or references.

6. If you have a question during the exam, stay seated and raise your hand.

7. When you are done: If there are fewer than 10 minutes left in the exam period, please wait patiently and quietly until the exam period is over. If you have finished more than 10 minutes early, you may quietly bring this exam booklet to the place indicated by the instructors.

   Read the questions carefully. I have tried to be clear. Good luck.
Part I: [minus 10 points if incomplete].

Make sure you have correctly, legibly, and accurately completed items 1-3 on the previous page.

Part II: [30 points out of 60 total].

1. [6 points] For each of the following answers, please assume the market interest rate, at which everybody can borrow or lend, is 6 percent. Round to the nearest decimal place.
   a)  What is the present discounted value of a perpetuity paying $30 per year, every year, with the first payment coming one year from today?
      $____________
   b)  What is the present discounted value of a perpetuity paying $30 per year, every year, with the first payment coming 17 years from today?
      $____________
   c)  What is the present discounted value of a financial instrument that pays you $100 per year, forever, starting next year, with the exception of year 20. I.e. it pays you $100 every year except for the payment 20 years from today, which is zero.
      $____________

2. [4 pts] A small town has eight (8) photocopy stores. Four of the stores have individual supply curves as follows:
   \[ q_i^S = 2 \times P \]
   where \( q_i^S \) is the supply from one of the four.

   Similarly, the other four stores have individual supply curves:
   \[ q_i^S = 3 \times P \]
   The town has 10 potential photocopy customers. Each has individual demand as follows:
   \[ q_i^D = 60 - P \]
   where \( q_i^D \) is the demand by one of the 10.

   What is the equilibrium quantity of copies in the town?
   \[ Q^* = \] ________________
3. [8 points] Circle the Nash equilibria in the following games. Not all are “dominant strategy” equilibria, and some may have more than one Nash equilibrium, or no equilibrium. If there's no equilibrium, indicate that clearly. Higher numbers mean higher payoffs. Player #2's payoffs are in the upper right of each box; player #1's are in the lower left of each box.

\( \text{Player 1} \) \hspace{1cm} \text{Player 2} \\
<table>
<thead>
<tr>
<th>Strategy #1</th>
<th>Strategy #2</th>
<th>Strategy #1</th>
<th>Strategy #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>20</td>
<td>10</td>
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<tr>
<td>80</td>
<td>20</td>
<td>30</td>
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<td>70</td>
<td>25</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>40</td>
<td>15</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

(a) 

4. [4 points] On the axes below, illustrate the following situations.

a. A tax on the buyers of the good. Show how the lines change and clearly shade in and label the DWL.

b. A subsidy to the buyers of the good. Show how the lines change and clearly shade in and label the DWL.
5. [8 pts] Low-income families in the USA can get help with their winter heating bills from a federal program known as LIHEAP (Low Income Home Energy Assistance Program). For the sake of simplicity assume the program works as follows:

A family of four has a monthly budget of $1100. LIHEAP will pay 50¢ of every $1.00 the family spends on heating, up to a maximum subsidy of $200. (The most LIHEAP will pay is $200 per month, or 50% of a $400 heating bill.)

a) On the axes below, draw the family's budget constraint. **Be sure to label all slopes, intercepts, and kink points (if any).**

```
\begin{tikzpicture}
    \draw[->] (0,0) -- (0,5) node[left] {$\text{\$ All other goods}$};
    \draw[->] (0,0) -- (5,0) node[below] {$\text{\$ Heat consumed}$};
\end{tikzpicture}
```

b) Consider a family that if it had the subsidy would purchase $410 worth of heat on a particularly cold winter month. For that family, is the program economically inefficient relative to giving them cash? (Yes or no.)

_______________

C) Consider a family that if it had the subsidy would purchase $210 worth of heat on a particularly cold winter month. For that family, is the program economically inefficient relative to giving them cash? (Yes or no.)

_______________
PART II. Multiple Choice  [1.5 points for each correct answer. Wrong answers and blank answers receive zero points.]

1. Sarah consumes two goods: steak and lobsters. They are not perfect complements. Sarah’s best affordable combination of steak and lobsters is $S$ steaks and $L$ lobsters. Then the prices change.

Scenario 1: Suppose steaks become cheaper and lobsters more expensive, and Sarah can afford exactly as much of each as before, with no funds left over. Is Sarah better off, worse off, indifferent, or is it impossible to tell?

a) better off
b) worse off
c) indifferent
d) it is impossible to tell

2. In the previous problem, suppose that instead of scenario 1 we have scenario 2.

Scenario 2: Suppose steaks become more expensive and lobsters cheaper, and Sarah can afford what she purchased before, with some funds left over. Is Sarah better off, worse off, indifferent, or is it impossible to tell?

a) better off
b) worse off
c) indifferent
d) it is impossible to tell

3. In the previous problem, consider instead scenario 3.

Scenario 3: Suppose steaks become more expensive and lobsters cheaper, and Sarah can no longer afford what she purchased before. Is Sarah better off, worse off, indifferent, or is it impossible to tell?

a) better off
b) worse off
c) indifferent
d) it is impossible to tell

4. Suppose the current price of coffee is $2 a cup, 1,000 cups are sold per day, and that demand and supply are neither perfectly elastic nor perfectly inelastic. A new tax of 50 cents per cup of coffee would raise:

a. Less than $500 in revenue.
b. Exactly $500 in revenue.
c. More than $500 in revenue.
d. It depends on the relative elasticities of supply and demand.
5. During the 1990’s, the price of VCR’s fell about 30%, and quantity sold decreased by the same amount. The demand for VCR’s must

a. be inelastic
b. be elastic
c. be unit elastic
d. have shifted to the left
e. have shifted to the right

6. If the price of muffins, a normal good you enjoy, rises,

a. both the income and substitution effects lead you to buy fewer muffins.
b. the substitution effect which causes you to decrease your muffin consumption outweighs the income effect which causes you to increase your muffin consumption, resulting in fewer muffins purchased.
c. the income and substitution effects offset each other but the price effect leads you to buy fewer muffins.
d. the income effect which causes you to decrease your muffin consumption outweighs the substitution effect which causes you to increase your muffin consumption, resulting in fewer muffins purchased.

7. Mitt and Ann open a catering business out of their home. Each week they spend $500 on food, $100 on advertising and $50 to rent a truck. They earn $1200 a week in revenue. Suppose Mitt and Ann use $5000 from their (offshore) savings account to buy a catering truck. What is the effect of this decision on their economic profit? (Ignore any depreciation in the truck’s value.) The decision to buy a catering truck ________

a. Increases economic profit because it eliminates the weekly truck rental payment.
b. Decreases economic profit because the implicit costs of the catering business have risen.
c. Increases economic profit if Mitt and Ann were earning less than $50 per week in interest on their $5000 saving balance.
d. Decreases economic profit because Mitt and Ann will no longer earn interest on their account.

8. If a firm has market power, then its marginal revenue ______

a. Is negative at quantities where demand is elastic.
b. Is zero at the quantity the firm chooses to produce.
c. Remains constant as long as price remains above marginal cost.
d. Is less than its price.
e. Is greater than its price.
9. Refer to figure 1. In the short run, if the price of the good is 4, how many units does the firm produce?
   a. 0
   b. 30
   c. 35
   d. 40

10. Refer to figure 1. In the long run, if the price of the good is 4, how many units does the firm produce?
    a. 0
    b. 30
    c. 35
    d. 40

11. Along a single indifference curve
    a. the marginal rate of substitution is constant.
    b. the consumer does not prefer one consumption bundle to another.
    c. the marginal rate of substitution is equal to 1.
    d. all consumption bundles are affordable.
    e. the consumer prefers points that have more of both goods.
12. Refer to the table at right that depicts data for a firm in a competitive industry. If the firm finds that its marginal cost is $11, it should

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Revenue</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$10</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
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<td>70</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
<td>82</td>
</tr>
</tbody>
</table>

a. increase production to maximize profit.
b. decrease production to maximize profit.
c. maintain its current level of production.
d. advertise to find additional buyers.

13. What happens to a budget line if all prices increase by 5% and income increases by 10%?

a. The budget line will remain the same.
b. The budget line will shift out, remaining parallel to the original budget line.
c. The budget line will shift in, remaining parallel to the original budget line.
d. The budget line will pivot about the intercept on the axis for the good that the consumer buys more of.

d. The budget line will pivot about the intercept on the axis for the good that the consumer buys more of.

14. Which of the following is an assumption about perfect competition?

a. Indifference curves do not cross.
b. Economic profits are zero.
c. Firms maximize profits.
d. There are many buyers and sellers.
e. All of the above.

15. In a cartel, each member has an incentive to cheat on its co-conspirators and do what?

a. Produce more than the agreed-upon amount.
b. Produce less than the agreed-upon amount.
c. Charge more than the agreed-upon price.
d. Charge more and produce less.
e. Wear a wiretap in the hopes of starring in a movie with Matt Damon.

16. In a perfectly competitive market, the demand for a single firm's product is always

a. exactly as elastic as the market demand curve.
b. inelastic, but not perfectly inelastic.
c. perfectly inelastic.
d. perfectly elastic.
17. A firm operating in long-run equilibrium in a perfectly competitive market will have economic profits equal to ________________.

a. zero.
b. total fixed costs.
c. the interest rate times the value of capital invested.
d. the present discounted value of future income streams.

18. If the price of an *inferior good* increases, which of the following is true?

a. People will demand more of it.
b. People will demand less of it.
c. People will demand less of it if the income effect outweighs the substitution effect.
d. People will demand less of it if the substitution effect outweighs the income effect.

19. The figure at right depicts a budget constraint. Suppose that Goods X and Y are perfect substitutes, and that the consumer's marginal rate of substitution (MRS) between X and Y is *not* equal to 1.0. Which of the depicted points represent possible optimal consumption combinations?

a. Any of the four points.
b. None of the four points.
c. (C).
d. (B) or (C).
e. (A) or (D).

20. If a firm’s demand curve is horizontal, the firm’s marginal revenue:

a. is less than the price of the product.
b. is equal to the price of the product.
c. is greater than the price of the product.
d. cannot be determined from the information given.

Please check your answers carefully. If there are fewer than 10 minutes left in the exam period, please wait patiently and quietly until the exam period is over. If you have finished more than 10 minutes early, you may quietly bring your coding sheet and this exam booklet to the place indicated by the instructors.

*Discussion sections *will* meet this week, and there's a homework set and an experiment setup on Aplia.*

See you Wednesday.