ECON 001
Fall 2018
Midterm 1
October 02, 2018
Time Limit: 60 Minutes

Name (Print): _____

Recitation Section: _____

Name of TA: _____

- This exam contains 7 pages (including this cover page) and 10 questions. Check to see if any pages are missing.
- The exam is scheduled for 1 hour.
- This is a closed-book, closed-note, no calculator exam.
- Answer each multiple choice question by writing the correct answer on the line at the right margin of the corresponding question. Make sure that your answer is clearly written or it will be marked incorrect.
- Write your answers to the other questions in the spaces provided below them. If you don't have enough space, continue on the back of the page and state clearly that you have done so.
- Do not remove any pages or add any pages. No additional paper is supplied
- Show your work when applicable. Use diagrams where appropriate and label all diagrams carefully.
- You must use a pen instead of a pencil to be eligible for remarking.
- This exam is given under the rules of Penn's Honor system.

My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.

Please sign here _____ Date _____

Question	Maximum	Grade
MC (Q1-8)	35	
1st SA (Q9)	35	
2nd SA (Q10)	30	
Total	100	

Multiple Choice Questions (best 7 out of 8: 35 points)

1. (5 points) Malcolm has just arrived in New York City for a well earned holiday but is given only three options of what to do by his wife Lucy. He can go see Hamilton ("boring!" thinks Malcolm) where he will have to pay $200 for a ticket, but if it was up to him he would only go if it was free. Alternatively he can go shopping with Lucy, where he knows he'll end up spending $200 but because Malcolm loves high-end fashion, he'll value his purchases at $500. Finally, he can stay in his hotel if he promises to work on his memoir (which doesn't come at any financial cost to him). He chooses this last option. What is the opportunity cost of his decision?

   A. $0
   B. $100
   C. $300
   D. $400
   E. $500

   1. **C**

2. (5 points) There are 4,000 tickets available for an Ed Sheeran concert happening in December. The demand for these tickets is given by $Q = 6,000 - 0.5P$. If the price of each ticket is $500, which of the following is be true?

   A. There is excess supply of concert tickets and the price will be driven up
   B. There is excess demand of concert tickets and the price will be driven up
   C. There is excess supply of concert tickets and the price will be driven down
   D. There is excess demand of concert tickets and the price will be driven down
   E. Not enough information

   2. **B**

3. (5 points) Suppose the quantity demanded of apples has increased at every price. Which of the following could have been the cause?

   I. A storm has unexpectedly decreased the crop of oranges, a substitute for apples
   II. The price of peanuts decreases, and consumers like to eat peanut butter and apples together
   III. Consumers' income increases, and apples is a normal good

   A. I only B. II only C. III only D. I and II E. I and III F. II and III G. I, II and III

   3. **G**

4. (5 points) After William helped his friend John out of a tight spot, John gave William a gift voucher for $100 to spend at one of John's many hotel restaurants. William believes a beer cost $15 and a steaks cost $25 at the restaurant and plans to purchase 5 beers and 1 steak. However, when William arrives for his dinner, he realizes that steaks are actually $20, and decides to purchase 4 beers and 2 steaks instead. Which of the following is true?

   I. Steak and beer are substitutes for William
   II. Steak and beer are complements for William
   III. Steak must be a normal good for William
   IV. Steak must be an inferior good for William

   A. I only B. II only C. I and III D. I and IV E. II and III F. II and IV

   4. **A**

5. (5 points) Philly's bike share service Indego has reported falling revenues in the past. To counteract that downward trend, the service decides to reduce its daily price for bike rental from \$11 to \$9, hoping to see an increase of 30% in Indego bike ridership. They are assuming that demand for Indego bike ride is:

   A. Unit Elastic
   B. Elastic
   C. Inelastic
   D. Can't be determined

   5. **B**

6. (5 points) Which of the following is always correct?

   A. The price elasticity of demand is equal to the slope of the demand curve.
   B. The equilibrium point is unit elastic
   C. If the cross-price elasticity of demand is positive, the two goods are complements
   D. Along a linear demand curve, the price elasticity of demand is constant
   E. None of the above

   6. **E**

7. (5 points) Paul owns a pumpkin picking farm in Pennsylvania. The market is perfectly competitive, with a demand $Q = 2,000 - 50P$ ($\Leftrightarrow P = 40 - 0.02Q$) and an equilibrium price of \$20 per pumpkin. Paul's total cost of production is $TC = 100 + q^2$ (so his marginal cost is $MC = 2q$). He asks his friends for advice on how to maximize his profit:

   I. John says: You should produce $q = 10$, because that's the quantity such that $ATC = MC$
   II. George says: You should produce $q = 10$, because market demand is unit-elastic in equilibrium
   III. Ringo says: You should produce $q = 10$, because the equilibrium quantity is 1,000 and there are 100 farms in this market
   IV. Mick says: You should produce $q = 10$, because producing more or less would decrease your producer surplus

   Which argument is correct?

   A. I only B. II only C. III only D. IV only E. I, II, III, and IV F. None

   7. **D**

8. (5 points) Alice owns a business that redevelops land along the coast. Unfortunately, due to a freak accident, the price of her service falls so far that she decides to shut down immediately. Which of the following is an complete and adequate justification for shutting down in the short run?

   A. The total revenue she would receive from continuing is less then her variable costs
   B. The total revenue she would receive from continuing is less then her fixed costs
   C. The price per block of redevelopment is below her average total cost
   D. The price per block of redevelopment is below her marginal cost
   E. All of the above

   8. **A**

Short Answer Questions (65 points total)

To get any point you must show your work.

9. Amy and Bob both like oranges and peaches, and for them consuming more of one makes consuming the other more enjoyable. The price of oranges is \$2 a pound and the price of peaches is \$1 a pound. Amy, whose budget is \$10 a week, purchases 2 pounds of oranges. Bob, whose budget is \$20 a week, purchases 6 pounds of oranges.

   (a) Each figure below corresponds to one consumer (Figure 1 for Amy, figure 2 for Bob). On each figure:
   - Draw the consumer's budget constraint (BC_A for Amy, BC_B for Bob). Label all intercepts
   - Label the optimal consumption point (A for Amy's, B for Bob's)
   - Draw an indifference curve that is consistent with the optimal choice for (IC_A for Amy, IC_B for Bob).

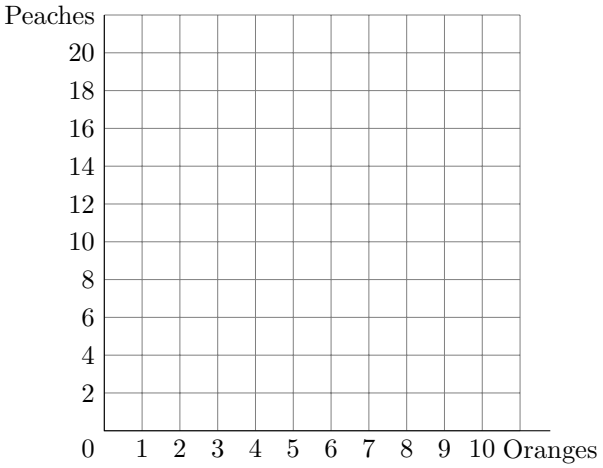


Figure 1: **Amy**

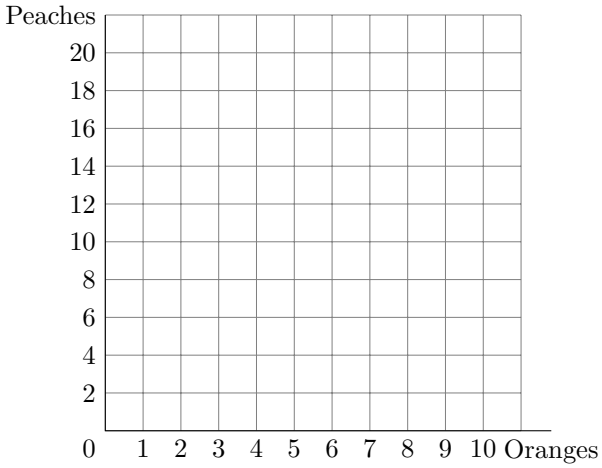
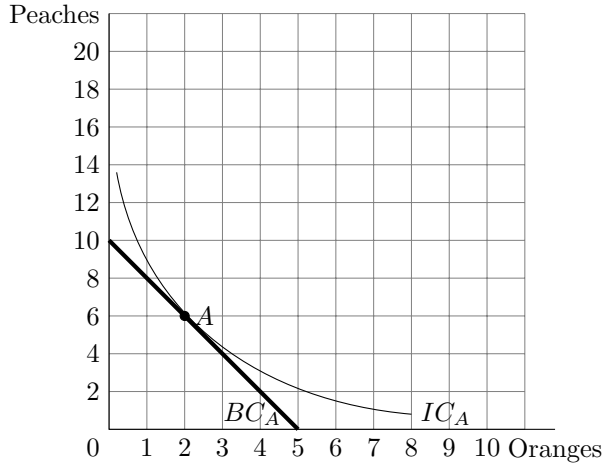
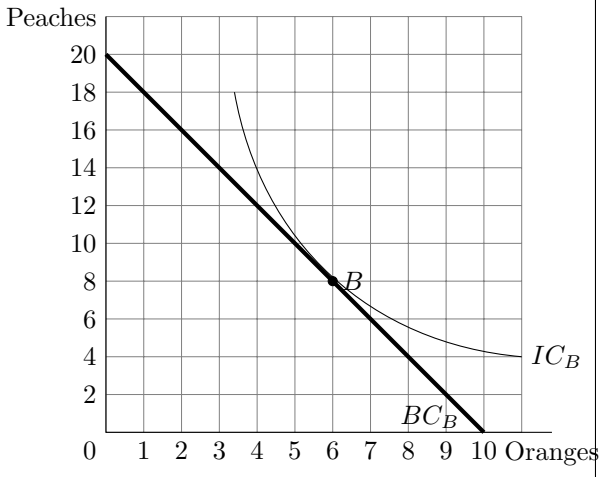


Figure 2: **Bob**

Solution:





   (b) At points A and B, compare the marginal rates of substitution MRS_A and MRS_B. Explain.

Solution: MRS_A=MRS_B at the optimal consumption points, because at that point the IC is tangent to the BC, so the slope of the IC is equal to the slope of the BC, which is the same for both consumers.

(c) Suppose the price of peaches increases to \$2 a pound. As a result, Amy now buys 3 pounds of oranges, and Bob now buys 8 pounds of oranges.

i. What is the impact on Amy's consumption of peaches? Can peaches be an inferior good for Amy? Explain.

Solution: Amy's consumption of peaches decreases: she now buys 2 pounds of peaches, while she was buying 6 pounds before. Yes peaches can be an inferior good for Amy: in that case, the income effect of an increase in the price of peaches (an increase in peaches consumption) will contradict the substitution effect (a decrease in peaches consumption), but as long as it is weaker, it is consistent with Amy's consumption of peaches decreasing overall.

ii. What is the impact on Bob's consumption of peaches? Are peaches and oranges complements or substitutes for Bob? Explain.

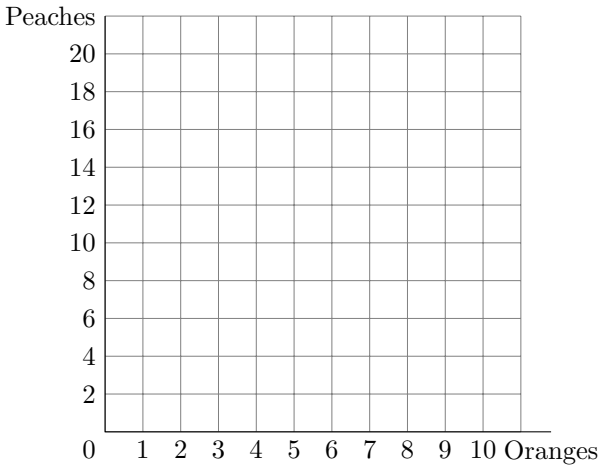
Solution: Bob's consumption of peaches decreases: he now buys 2 pounds of peaches, while he was buying 8 pounds before. Peaches and oranges are substitutes for Bob because an increase in the price of peaches leads to an increase in Bob's consumption of oranges from 6 to 8 pounds.

iii. Assuming Amy and Bob are the only two consumers in the market for peaches, use the information above to determine whether the market demand for peaches is elastic, inelastic or unit-elastic between prices of \$1 and \$2 per pound. Explain.

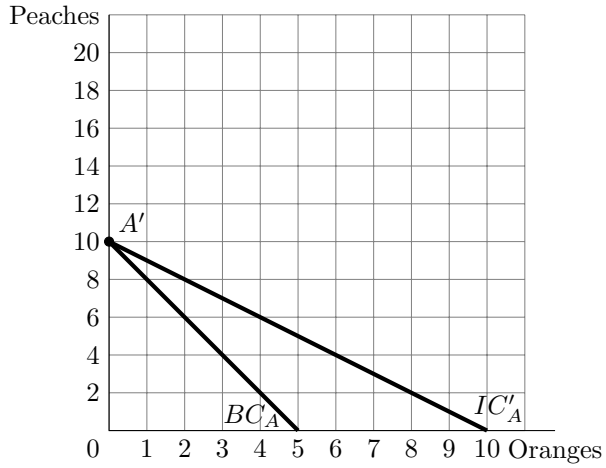
Solution: At a price of \$1, the market quantity demanded is $6 + 8 = 14$ pounds, and at a price of \$2, the market quantity demanded is $2 + 2 = 4$ pounds. Therefore, the price elasticity of demand between these two prices is: $\varepsilon = \frac{(4-14)/9}{(2-1)/1.5} = -\frac{5}{3}$. Since $\frac{5}{3} > 1$, demand for peaches is elastic in that price range.

(d) Suppose the price of peaches is back to \$1 a pound, so that Amy faces her original budget constraint BC_A. However, she now gets exactly the same additional satisfaction from 1 orange as she does from 1 peach. In the graph below:

- Draw Amy's original budget constraint BC_A (as in part (a))
- Draw Amy's indifference curve consistent with the information above IC'_A
- Plot Amy's optimal consumption point A'



Solution:



10. Suppose the market for coffee at Penn is perfectly competitive, with 10 identical coffee shops. In the short run, labor is the only variable input used to produce coffee and the daily wage is \$20 per worker.

(a) The short run production function of a given coffee shop is given in the following table, where L is the number of workers hired and q is the quantity of coffee produced by the shop. Find the marginal product of each worker MP_L, and the marginal cost of production MC for each quantity q.

Solution: $MP_L = \frac{\Delta Q}{\Delta L}$, $MC = \frac{w}{MPL}$.

L	q	MP_L	$MC(\$)$
0	0	-	-
1	20	**20**	**1**
2	30	**10**	**2**
3	35	**5**	**4**
4	39	**4**	**5**
5	40	**1**	**20**

(b) Knowing there are identical 10 coffee shops, use the marginal costs you found in part (a) to determine the optimal quantity supplied Q_S by the market for each of the prices in the table below.

Note: it is possible to skip part (b) and still be able to answer the subsequent parts.

Solution: The market supply can be found by summing horizontally across the individual firm's short-run marginal cost curves. Note, technically we need that $MC \geq AVC$, but one can easily verify that firm $MC = AVC$ at $Q = 20$ which corresponds to $P = \$1$.

$P(\$)$	Q_S
1	**200**
2	**300**
4	**350**
5	**390**
20	**400**

(c) Suppose the demand for coffee at Penn is given by $Q_D = 500 - 100P$ (so the inverse demand is $P = 5 - 0.01Q_D$), and the equilibrium price in the market is $P^* = \$2$. Find the optimal quantity q^* produced by each shop and the market quantity Q^* in equilibrium.

Solution: Each firm produces the quantity such that $P^* = MC$. Since $P^* = \$2$, each firm produces the quantity such that $MC = \$2 \Leftrightarrow q^* = 30$. There are 10 firms, so market quantity is $Q^* = 10q^* = 300$.

Another way to find this is to plug the equilibrium price into the market demand equation to find the market quantity: $Q^* = 500 - 100P^* = 300$. Since there are 10 identical shops, each of them produces $q^* = Q^*/10 = 30$.

(d) Find the market consumer surplus in equilibrium.

Solution: Consumer surplus is the triangle below the market demand and above the price: $CS = (\$5 - \$2) \times 300 \times 0.5 = \$450$.

(e) Find the individual producer surplus in equilibrium ps, and the market producer surplus PS.

Solution: Individual producer surplus is $ps = TR - VC$. In equilibrium, individual quantity is 30 so the firm hires 2 workers at a wage of \$20 each, so the variable cost is $VC = \$40$. Therefore, $ps = \$2 \times 30 - \$40 = \$20$. There are 10 identical firms, so $PS = \$200$.