"I have neither given nor received aid on this exam"_____
(signature)

The following formula might be useful: $E_p = (P/Q)*(1/\text{slope})$

I. Discussion Questions (12.5 points each…50 points total):

1. The demand for calculators is $Q^d = 100 - 50P$, where P is the price of calculators.

    a. Graph the demand for calculators below. Label your axes and intercepts. (4 points)

    b. What is the slope of the demand curve for calculators? (2 points)

    c. What is the price elasticity of demand for calculators if P = $0.50? (hint, calculate a number) (3 points)

    d. In words, precisely interpret the price elasticity number that you calculated in (c). (3.5 points)

2.

East Lake		West Lake	
# of Boats	Average # Fish	# of Boats	Average # of Fish
1	10	1	6.5
2	9	2	6.5
3	8	3	6.5
4	7	4	6.5
5	6	5	6.5

a. Using the above chart, suppose Madison has 4 fishing boats. She doesn't have to send all boats to the same lake…she can allocate the boats however she chooses. What is the optimal method of allocating 4 fishing boats between these two lakes? [*No credit given if you don't show your work*] (6.5 points)

b. Based on your answer from (a), how many fish will be caught from the East Lake? (3 points)

c. Based on your answer from (a), how many fish will be caught from the West Lake? (3 points)

3. Your company owns two t-shirt making plants: one plant in Ayden and the other in Grimesland with the following marginal cost and average total cost curves (subscripts A & G denote Ayden and Grimesland, respectively):

$$MC_A = 12Q_A \qquad ATC_A = 6Q_A + 16/Q_A$$
$$MC_G = 4Q_G \qquad ATC_G = 2Q_G + 240/Q_G$$

    a.   What is the least costly way of producing 32 t-shirts? (6.5 points)

    b.   Using your answer in (a), what is the marginal cost of making the last unit in Ayden? (2 points)

    c.   Using your answer in (a), what is the marginal cost of making the last unit in Grimesland? (2 points)
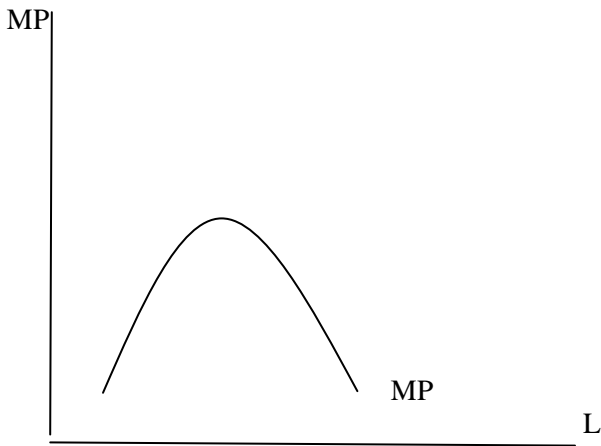
    d.   What is the total cost to produce 32 t-shirts? (2 points)

4. Complete the following table for the short-run cost curves for the production function: $Q = 2KL$ where in the short-run K is fixed at 2 units, with the rental price of capital = \$3 and the wage rate = \$4. (1.5 points per column)

Workers	Output	TC	VC	FC	ATC	AVC	AFC	MC
0	0	6	0	6	--	--	--	--
1	4	10	4	6	2.5	1	1.5	1
2	8	14	8	6	1.75	1	0.75	1

On the graph above, draw the marginal cost curve.

II. Multiple Choice: (20 questions, worth 2.5 points each…50 points total)

1. Two goods, X & Y, all called substitutes if
    a) An increase in Px causes more Y to be bought.
    b) An increase in Px causes less Y to be bought.
    c) An increase in Py causes less Y to be bought.
    d) An increase in income causes more of both X & Y to be bought.

2. If good X is an inferior good and income rises, then quantity demanded
    a) May or may not fall.
    b) Will always fall.
    c) Will always rise.
    d) Will remain unchanged.

3. An increase in demand is represented by
    a) A shift outward of the entire demand curve.
    b) A shift inward of the entire demand curve.
    c) A movement along the demand curve in a southeasterly direction in response to a decline in the good's price.
    d) A movement along the demand curve in a northwesterly direction in response to a decline in the good's price.

4. What is the definition of a normal good? (E_I is income elasticity of demand, E_P is price elasticity of demand)
A) $E_I > 0$
B) $E_P > 0$
C) $E_I > 1$
D) $0 < E_P < 1$
E) $0 < E_I < 1$

5. If you operate a donut shop and you learn that your consumers have price elastic demand, then how can you increase your revenues?
   a. Use more capital and fewer workers.
   b. Use less capital and more workers.
   c. Lower prices.
   d. Raise prices.
   e. Keep prices unchanged.

6. The price elasticity of demand for beer is -0.9%. Interpret this number:
A) if income falls 1% then quantity demanded of beer falls 0.9%.
B) if income rises by 1% then quantity demanded of beer falls 0.9%.
C) if price rises by $1 then quantity demanded of beer falls by 0.9%
D) if price rises by 1% then quantity demanded of beer rises by 0.9%
E) if price falls by 1% then quantity demanded of beer rises by 0.9%

7. The demand for good x is a function of income, price of good x and price of good y. What happens to the demand for good x if your income doubles and all prices double.
A) demand for good x is unchanged.
B) demand for good x increases.
C) demand for good x decreases.

8. The curve that shows the various input combinations that cost the same is called a (an):
A) Engel curve
B) isoquant curve
C) minimum efficient scale
D) isocost curve
E) indifference curve

9. Find the returns to scale for the following function: $Q = 2KL$
A) increasing returns to scale
B) decreasing returns to scale
C) constant returns to scale

10. What is marginal rate of technical substitution?
A) the substitution of good x for good y that provides the same level of utility.
B) the curve that shows all input combinations that produces the same level of output
C) the curve that shows all input combinations that cost the same.
D) the point in which marginal productivity begins to fall
E) the rate in which one input can be substituted for another while leaving output unchanged.

Use the following information to answer the next question. An apple orchard uses both machines and workers to pick apples. The daily rental price of an apple picking machine is $40 while the daily wage rate per apple picker is $50.

K

|_____L
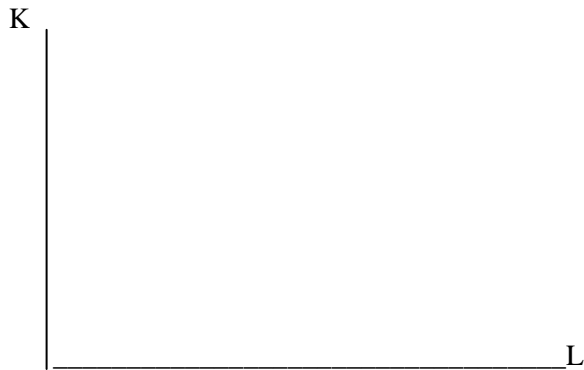
11. In the space above, draw an isocost curve for this apple orchard spending $200. What is the isocost curve slope?
A) -2/5
B) -5/4
C) -5/2
D) -4/5
E) -4

12. Given the marginal product of daily rental price of capital is $50 and the daily wage rate per worker is $40. The marginal product of workers is 20 and the marginal product of capital is 30. What is your recommendation for this company?

A) Rent more capital and fire workers.
B) Rent less capital and hire workers.
C) Don't change anything, since this company is already optimally using its inputs.

Use the graph below to answer questions 13-16.
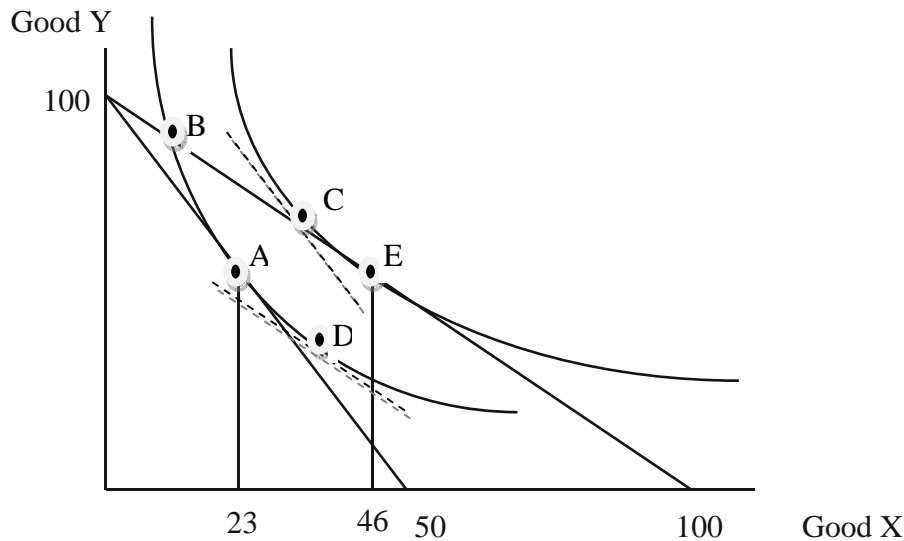
13. If M = $100, P_Y = $1, and P_X = $1. Find the best affordable bundle.
    A) A
    B) B
    C) C
    D) D
    E) E

14. Suppose the price of X increases from $P_X = 1 to $P_X = 2. Everything else is unchanged (M = $100 & $P_Y = 1). The total effect is represented by moving from point_____ to point_____.
    A) E to A
    B) D to C
    C) D to E
    D) E to C
    E) A to E

15. The substitution effect due to the price of X increasing is represented as moving from point_____ to point_____.
    A) E to A
    B) C to A
    C) C to E
    D) E to C
    E) A to D

16. The income effect due to the price of X increasing is represented as moving from point_____ to point_____.
    A) A to C
    B) D to E
    C) B to C
    D) D to E
    E) C to A

17. If Jerry and Ben's demand curves are: $P = 4 - Q_J$ and $P = 4 - 2Q_B$. Find the market demand curve.
    A) $P = 4 - (1/3)Q$
    B) $P = 8 - 3Q$
    C) $P = 8 - (3/2)Q$
    D) $P = 4 - (2/3)Q$
    E) $P = 4 - (3/2)Q$

18. The cross-price elasticity of coffee and creamer is most likely:
A) positive
B) negative
C) zero

19. Joe earns $12 each week. He buys two goods: pepperoni pizza ($2 per slice) and Diet Coke ($0.50 per can). Joe only likes to eat a slice of pepperoni pizza drink if he can drink two Diet Coke cans with it. What is his optimal bundle?
     A. 6 pepperoni pizza slices and 12 Diet Cokes
     B. 6 pepperoni pizza slices and 0 Diet Cokes
     C. 0 pepperoni pizza slices and 12 Diet Cokes
     D. 3 pepperoni pizza slices and 6 Diet Cokes
     E. 4 pepperoni pizza slices and 8 Diet Cokes

20. Which of the figures below represents Long-run average costs curves for a increasing returns production function?
A) Figure 1
B) Figure 2
C) Figure 3

Figure 1

LAC

Q

Figure 2

LAC

Q

Figure 3

LAC

Q