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

The following formula might be useful: $E_p = (P/Q)*(1/slope)$
I. Discussion Questions (12.5 points each…50 points total):

1. The demand for calculators is $Q^d = 5 - \frac{1}{2}P$, 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 = 6? (hint, calculator 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	40	1	46
2	39	2	44
3	38	3	42
4	37	4	40
5	36	5	38

a. Using the above chart, suppose Madison has 5 fishing boats. What is the optimal method of allocating 5 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? (2 points)

c. Based on your answer from (a), how many fish will be caught from the West Lake? (2 points)

d. How many total fish are caught? Show your work. (2 point)

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):

$$MC_A = Q_A \qquad\qquad ATC_A = \tfrac{1}{2}\,Q_A$$
$$MC_G = 2 + Q_G \qquad\qquad ATC_G = 2 + \tfrac{1}{2}Q_G$$

    a. What is the least costly way of producing 20 t-shirts? (6.5 points)

    b. How much did it cost to produce the t-shirts selected in (a) from Ayden? (2 points)

    c. How much did it cost to produce the t-shirts selected in (a) from Grimesland? (2 points)

    d. What is the total cost to produce 20 t-shirts? (2 point)

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 = $4 and the wage rate = $5. (1.5 points per column)

Workers	Output	TC	VC	FC	ATC	AVC	AFC	MC
0					--	--	--	--
1								
2								

*Extra Credit Eligibility – You must meet these two criteria to answer the extra credit question below:
- Please skip the extra credit question if your cell phone rang in class since the 1st test
- Please skip the extra credit question if you are not taking this test during the normally scheduled time in class (Oct. 29th at 9am)

Extra Credit (+3): Which state has the highest cigarette taxes per pack in the U.S.?

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

Use the following table to answer the next two questions:

Labor	Output	Marginal Product	Average Product
0	0	--	--
1	8		
2			9
3	30		
4		13	
5	55		

1. What is the marginal product from the 3rd worker?
A) 10
B) 11
C) 12
D) 13
E) 14

2. Do diminishing returns to labor appear in the above chart? If so, where does this occur?
A) Yes, after the 1st worker is hired
B) Yes, after the 2nd worker is hired
C) Yes, after the 3rd worker is hired
D) Yes, after the 4th worker is hired
E) No (diminishing returns are not exhibited in the above graph).

3. What is the difference between decreasing returns to scale and diminishing returns?
A) nothing, since they are the same thing.
B) decreasing returns shows output responses following a change in 1 input, while diminishing returns shows output responses following changes in all inputs
C) decreasing returns shows output responses following a change in all inputs, while diminishing returns shows output responses following a change in 1 input

4. What is the definition of a necessary 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. You own a barber shop. After hiring an economist you discover the price elasticity of demand for your barber shop is -1.2. What should you do to increase your revenues?
A) do nothing. Since already maximizing revenues.
B) increase price.
C) decrease price.

6. The income elasticity for shoes is 1.10. What does this mean in words?
A) a 1% increase in price, causes quantity demanded to decrease by 1.1%.
B) a $1 increase in income, causes quantity demanded to increase by 1.1%.
C) a $1 increase in income, causes quantity demanded to increase by $1.10.
D) a 1% increase in income, reduces quantity demanded by 1.1%.
E) a 1% increase in income, increases quantity demanded by 1.1%.

7. If the price elasticity of demand is unit elastic…what does this mean?
A) if price increases by 1% then the decrease is quantity demanded will be smaller than 1%
B) if price increases by 1% then the decrease in quantity demanded will be exactly 1%
C) if price increases by 1% then the decrease is quantity demanded will exceed 1%

8. An example of a natural monopoly is:
A) Starbucks
B) McDonalds
C) Sheets
D) Greenville Utilities
E) Proctor and Gamble

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 the output expansion path?
A) various input combinations that yield the same output.
B) how easily can capital can be substituted for labor.
C) various input combinations that cost the same.
D) shows all of the optimal input combinations.
E) the change in capital divided by the change in labor.

Use the following information to answer the next two questions: An apple orchard uses both machines and workers to pick apples. The daily rental price of an apple picking machine is $60 while the daily wage rate per apple picker is $40.

K

_____L

11. In the space above, draw an isocost curve for this apple orchard spending $240. What is the isocost curve slope?
   A) -2/3
   B) -2
   C) -5/2
   D) -3/2
   E) -3

12. Given the daily rental price of an apple picking machine is $60 and the daily wage rate per apple picker is $40. Currently the apple orchard uses 120 workers and rents 70 machines. The marginal product of workers = 30 and the marginal product of machines=40. What is your recommendation for this apple orchard?

A) Rent more machines and fire workers.
B) Rent fewer machines 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.
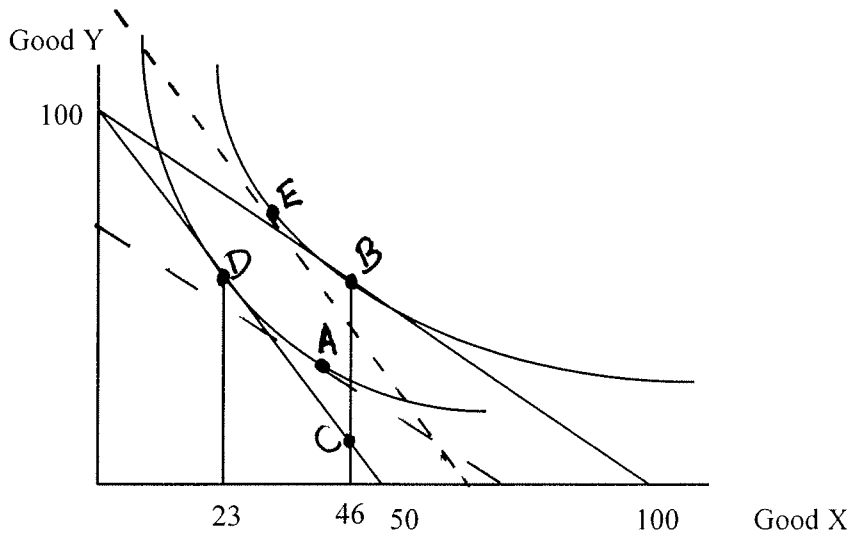
13. If M = $200, P_Y = $2, and P_X = $2. Find the best affordable bundle.
   A) A
   B) B
   C) C
   D) D
   E) E

14. Suppose the price of X increases from P_X = $2 to P_X = $4 (while M = $200 & P_Y = $2 are unchanged). The total effect is represented by moving from point_____ to point_____.
   A) B to A
   B) D to A
   C) D to B
   D) C to D
   E) B to D

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

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

17. If Jerry and Ben's demand curves are: $P = 8 - 4Q_J$ and $P = 8 - 2Q_B$, respectively. Find the market demand curve.
A) $P = 12 - (3/4)Q$
B) $P = 16 - 6Q$
C) $P = 16 - (4/3)Q$
D) $P = 8 - (4/3)Q$
E) $P = 8 - (3/4)Q$

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

19. How do you interpret a price elasticity of supply of 1.2?
   A. If prices rise by $1, then quantity supplied increases by 1.2 units
   B. If prices rise by $1, then quantity supplied increases by 1.2%
   C. If prices fall by 1%, then quantity supplied increases by 1.2%
   D. If prices fall by 1%, then quantity supplied falls by 1.2%
   E. If prices rise by 1%, then quantity supplied increases by 12%

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

Figure 1   Figure 2   Figure 3

LAC (Figure 1)   LAC (Figure 2)   LAC (Figure 3)

Q   Q   Q