Midterm 2

You have until 6pm to complete the exam, be certain to use your time wisely. For multiple choice questions, mark your answer on your scantron sheet. Choose only one answer for each multiple choice question; if more than one letter is chosen for a question it will be marked wrong. Write your answers for the short answer section directly on the exam. For the short answer questions, show your work clearly, place a box around final answers and be certain to label any graphs you draw. Final answers may be left as fractions. Non-graphing calculators may be used but they should not be necessary. Remember to put your name and ID number on both the exam (in the spaces provided below) and on the scantron sheet. Good luck!

Name: **ID Number:**   **Section:**

SECTION I: MULTIPLE CHOICE (60 points)

1. For a firm's production technology, the marginal product of labor is increasing as the amount of labor used increases. When graphed with labor on the horizontal axis and output on the vertical axis, the production function will:

    (a) Have a positive slope.
    (b) Have a slope that increases as labor increases.
    (c) Have a slope that decreases as labor increases.
    (d) (a) and (b).
    (e) (a) and (c).

2. Suppose that cars and burgers are the only two goods we consume, we spend all of our money on cars and burgers and when income goes up our consumption of both cars and burgers goes up. If cars are a luxury good, then the income elasticity of demand for burgers must be:

    (a) Between -1 and 0.
    (b) Less than -1.
    (c) Between 0 and 1.
    (d) Greater than 1.

3. If the price elasticity of demand for newspapers is given by $\epsilon = \frac{-p}{10-p}$ where p is the price of newspapers, what price will maximize revenue?

    (a) 0.
    (b) 5.
    (c) 10.
    (d) 15.

4. If a firm uses a constant returns to scale technology and has positive fixed costs, then profits will _____. (You can assume the prices of output and inputs remain constant.)

   (a) Increase when the levels of all inputs are doubled.
   (b) Decrease when the levels of all inputs are doubled.
   (c) Remain the same when the levels of all inputs are doubled.
   (d) Whether they increase or decrease will depend on the wage and rental rate of capital.

5. Suppose that the government proposes two taxes. One is a quantity tax on apples and the other is a value tax on apples. Analysts determine that both taxes will raise the same amount of tax revenue. What can we say for certain about the consumer surplus from apples?

   (a) Consumer surplus will be greater under the quantity tax than under the value tax.
   (b) Consumer surplus will be greater under the value tax than under the quantity tax.
   (c) The change in consumer surplus from either tax will be greater than the change in producer surplus.
   (d) The change in consumer surplus will be the same under either tax.

6. A firm uses workers, electricity and machines to produce output. Currently, machines are a fixed input, electricity is a quasi-fixed input, and the firm is maximizing profits by hiring 100 workers. If electricity were a fixed input rather than a quasi-fixed input, the profit-maximizing number of workers hired by the firm in the short run will be:

   (a) Greater than 100.
   (b) Equal to zero.
   (c) Greater than or less than 100.
   (d) Equal to 100.

7. If labor is the only input used by a firm and a graph of output as a function of labor, with labor on the horizontal axis, is upward sloping and getting flatter as labor gets larger, then a graph of costs as a function of output, with output on the horizontal axis, will be:

   (a) Upward sloping and getting flatter as output gets larger.
   (b) Upward sloping and getting steeper as output gets larger.
   (c) Downward sloping and getting flatter as output gets larger.
   (d) Downward sloping and getting steeper as output gets larger.

(i)   (ii)   (iii)
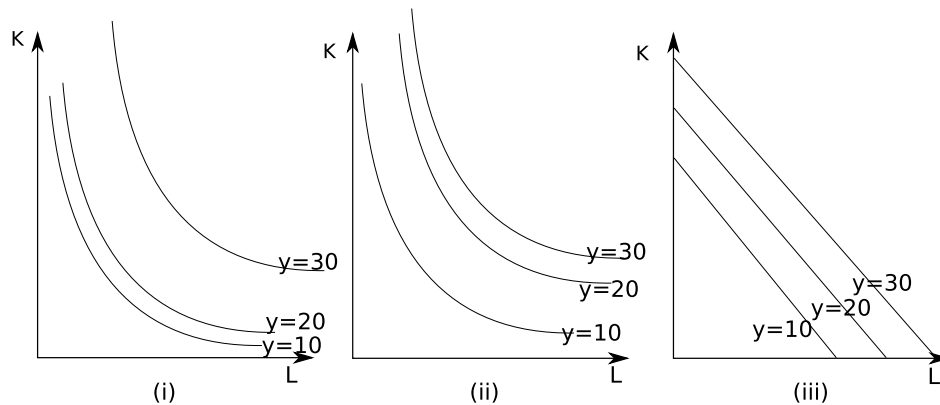
Use the graphs above of the isoquants for three different production technologies to answer questions 8 through 10.

8. Which of the production technologies exhibit increasing returns to scale (at least for the output levels shown)?

    (a) (i)
    (b) (ii)
    (c) (iii)
    (d) None of the production technologies exhibit increasing returns to scale.

9. For production technology (iii), capital and labor are:

    (a) Perfect complements in production.
    (b) Perfect substitutes in production.
    (c) Fixed factors of production.
    (d) None of the above.

10. Which of the graphs depict a production technology with a diminishing technical rate of substitution?

    (a) (i).
    (b) (ii).
    (c) (i) and (ii).
    (d) (i), (ii) and (iii).

11. If peanut butter and jelly are complements, then we can say for certain that:

    (a) We will consume either all peanut butter or all jelly.
    (b) The price elasticity of demand for peanut butter will be positive.
    (c) The cross price elasticity of demand for jelly will be positive.
    (d) The cross price elasticity of demand for peanut butter will be negative.

12. If y is a Giffen good and the price of y increases, then:

    (a) The substitution effect for y will be positive.

    (b) The magnitude of the substitution effect will be smaller than the magnitude of the income effect.

    (c) The sign of the subsitution effect and the income effect will be the same.

    (d) Not enough information.

13. If a firm uses inputs x and y to produce output and y is fixed in the short run, then the firm can maximize profits in the short run by setting the marginal product of x equal to:

    (a) The price of x divided by the price of y.

    (b) The price of y divided by the price of x.

    (c) The price of y divided by the price of output.

    (d) The price of x divided by the price of output.

14. The demand curve for chips is a downward sloping line and the supply curve for chips is an upward sloping line. If a quantity tax is placed on chips, we can say for certain that the dead weight loss generated by the tax will:

    (a) Increase as the tax increases.

    (b) First increase and then decrease as the tax increases.

    (c) Depend on whether the tax was placed on consumers or producers.

    (d) Be smaller than the revenue from the tax.

15. A firm's production function is $f(K, L) = 10K^{\frac{1}{2}}L^{\frac{1}{2}}$. The wage rate is \$10 the rental rate of capital is \$5. In the short run capital is fixed. If the firm is using 16 workers in the short run and is producing 200 units of output, what are the firm's fixed costs? (You can assume that the firm is maximizing profits.)

    (a) \$25.

    (b) \$100.

    (c) \$125.

    (d) \$160.

    (e) \$185.

16. Suppose that a firm uses a production technology that uses capital and labor as inputs, exhibits diminishing technical rate of substitution, diminishing marginal product of labor and diminishing marginal product of capital. In the short run, capital is fixed. An increase in the rental rate of capital will ____ labor used in the short run and ____ labor used in the long run. (Assume that in the long run, the firm wants to maintain the same level of output as before the price change.)

    (a) Increase, decrease.

    (b) Decrease, increase.

    (c) Not change, decrease.

    (d) Not change, increase.

    (e) Not change, not change.

17. A firm uses capital and labor to produce output and has standard, convex isoquants. On a graph with labor on the horizontal axis and capital on the vertical axis, the slope of the the isoquant at the firm's current choice of inputs is greater than the wage divided by the rental rate of capital. The firm can maintain the same level of output and decrease costs by:

    (a) Increasing capital and increasing labor.
    (b) Decreasing capital and decreasing labor.
    (c) Increasing capital and decreasing labor.
    (d) Decreasing capital and increasing labor.

18. A consumer always spends all of his money on x and y. When the price of good x increases, the substitution effect for good y will:

    (a) Be negative if x and y are complements.
    (b) Be negative if x and y are substitutes.
    (c) Be positive only if x and y are complements.
    (d) Be positive whether x and y are substitutes or complements.

19. The decrease in producer surplus resulting from a quantity tax will:

    (a) Be larger if the tax is placed on consumers.
    (b) Be larger if the tax is placed on producers.
    (c) Be larger if demand is very elastic.
    (d) Be larger if demand is very inelastic.

20. The demand curve for donuts is a downward sloping line and the supply curve for donuts is an upward sloping line. If a quantity tax is placed on consumers, we can say for certain that it will generate tax revenue that is:

    (a) Greater than the combined loss is consumer and producer surplus.
    (b) Less than the combined loss in consumer and producer surplus.
    (c) Greater than the dead weightloss.
    (d) Less than the deadweight loss.

SECTION II: SHORT ANSWER (40 points)

For this section, be certain to show your work and clearly label any graphs you draw. Give complete answers but keep them concise. Please place a box around final answers where appropriate.

1. Suppose that burritos and tacos are substitutes. Use a graph to clearly show the income and substitution effects (including the sign and the relative magnitude of the effects) for both tacos and burritos when the price of tacos increases. Tacos should be on the horizontal axis and burritos should be on the vertical axis. You can assume that burritos and tacos are normal, ordinary goods and that indifference curves are convex. Be certain include all relevant labels on the graph. (10 points total)

2. Suppose that demand for pizza slices for Alex is given by $D_A = 20 - 2P$ and for Billy is given by $D_B = 10 - 3P$ where P is the price of a slice of pizza. The market supply of pizza slices is given by $S(P) = -1 + 2P$. (8 points total)

   (a) Derive an expression for the market demand for pizza slices, assuming that Alex and Billy are the only consumers of pizza.

   (b) Given your market demand from part (a), what is the price elasticity demand for pizza when pizza costs $5 a slice?

3. A firm uses capital and labor to produce tshirts. The firm's production technology is given by $f(K, L) = K^{\frac{1}{3}} L^{\frac{1}{3}}$. (22 points total)

   (a) In the short run capital is fixed at 8 units. The price of output is $2, the rental rate of capital is $2 and the wage $3. Find the profit-maximizing level of labor and the level of profits in the short run.

   (b) Derive an expression for costs as a function of the number of tshirts produced in the long run. Your expression should not contain any variables other than the number of tshirts.

   (c) Does the production function exhibit increasing, decreasing or constant returns to scale? Be certain to justify your answer by showing appropriate work.