MIDTERM 1 MATERIAL

1. $U(x_1, x_2) = 5 \min[x_1, x_2/4]$
   a. Find the demand functions for x_1 and x_2
   b. Prove the demand for x_1 is scale invariant
   c. Find $MU_1(2, 10)$ and $MU_2(2, 10)$

2. Write a utility function that shows I prefer a bundle of 4 apples and 2 bananas to a bundle of 8 apples and 3 bananas.

3. $U(x, y) = \min[(x + 2y), (2x + y)]$
   a. Graph the indifference curve where utility equals 4
   b. What is the MRS at (2, 1)?
   c. Solve for x* and y*
      i. If $p_x = 1$, $p_y = 1$, and $m = 8$
      ii. If $p_x = 1$, $p_y = 4$, and $m = 8$
      iii. If $p_x = 4$, $p_y = 1$, and $m = 8$

4. My income is \$30 and good 2 costs \$1. The first 5 units of good 1 each cost \$1, the next 5 units of good 1 each cost \$2, the next 5 units of good 1 each cost \$3, and every unit of good 1 thereafter each costs \$4. (For example, if I choose to buy 7 units of good 1, the first 5 units cost \$1 and the next 2 units cost \$2, for a total of \$9).
   a. Find x_1^* and x_2^* if $u(x_1, x_2) = 3x_1 + 2x_2$
   b. Find x_1^* and x_2^* if $u(x_1, x_2) = 4x_1 + x_2$

MIDTERM 2 MATERIAL

5. $x_1^* = m / 2p_1$ $\quad$ $x_2^* = m / 2p_2$

   OLD: $p_1 = 2$ $\quad$ $p_2 = 2$ $\quad$ $m = 8$

   NEW: $p_1 = 2$ $\quad$ $p_2 = 0.5$ $\quad$ $m = 8$

   Assume $SE_1 = -1$. Which one of the following is true?
   a. $TE_2 = 4$
   b. $IE_1 = -1$
   c. $SE_2 = 2$
   d. $IE_2 = 3$
   e. None of the above

6. $E_{c1,\,r} = 0.5$

   Which of the following could be true?

   a. The consumer is a saver
   b. The consumer is a borrower
   c. The elasticity of c_2 (with respect to the interest rate) is positive
   d. Multiple answers above are correct
   e. Not enough information

7. Illustrate the case of a risk lover who chooses a \$90 guaranteed payment over a gamble (the gamble offers a 75% chance of winning \$100 and a 25% chance of winning \$20).

8. Assume that the exact values of m, p_1, and p_2 are unknown, but it is known that both m and p_1 double, and p_2 stays the same. Which of the following must be true if both x_1 and x_2 are normal goods and the consumer has convex preferences?

   a. There is no IE on x_1
   b. The maximum amount of both x_1 and x_2 that the consumer can afford changes
   c. The IE's on x_1 and x_2 move in opposite directions
   d. The direction of the effects would depend on the initial levels of p_1, p_2, and m
   e. None of the above

9. There's no inflation and $m_1 = m_2 = 16$. The consumer can save at an interest rate of 50% and borrow at an interest rate of 100%.

   a. Draw and label the budget constraint
   b. $U(c_1, c_2) = 3c_1 + c_2$. Solve for c_1^* and c_2^*

<u>FINAL MATERIAL</u>

10. $MP_L = 16 - 2L$; $F(L) = 18$ when $L = 1$

    a. Find L^{LR} if $p = 3$ and $w = 30$
    b. Find L^{LR} if $p = 3$ and $w = 50$

11. $F(L) = 2L^{1/2}$

    a. Find the long run firm supply. Assume p = \$4 and w = \$2. What are the firm's profits?

b. Find the long run firm supply. Assume $p = \$4$, $w = \$2$, and the government imposes a flat tax of \$6 on any firm that chooses to operate. What are the firm's profits?
c. Find the long run firm supply. Assume $p = \$4$ and $w = \$2$. Also assume that, instead of imposing a flat tax, the government imposes a per unit sales tax of 25%. What are the firm's profits?

12. $F(L, K) = L + 4K$ (where L is the number of hours the firm's employees work and K is the number of machines the firm buys).
    a. Find long run cost minimizing demands for L and K assuming that $r = \$20$ and Q is fixed at 12 units. In addition, assume that the wage for the first four hours of work is \$4/hr and the wage for every hour after that is \$6/hr.
    b. Find long run profit maximizing demands for L and K and the long run firm supply assuming that $p = \$4.50$ and $r = \$20$. In addition, assume that the wage for the first four hours of work is \$4/hr and the wage for every hour after that is \$6/hr.

13. $F(L, K) = 2 \min[L/4, K/2]$
    a. Find LTC, LAC, and LMC (assume w and r are unknown)
    b. Find long run firm supply (assume w and r are unknown)

14. $SAVC = [(wQ^3) / K]$. The firm has a production function that is Cobb-Douglas and uses both labor and capital.
    Which of the following must be true?
    a. The firm's long run firm supply is infinite
    b. The firm's long run marginal cost is equal to its long run average cost
    c. As Q increases, the firm's long run total cost increases at an increasing rate
    d. The elasticity of the firm's long run cost minimizing labor demand is -1/4
    e. None of the above

15. $F(L, K) = 2L + 8K$
    a. Find LTC, LAC, and LMC (assume w and r are unknown)
    b. Find long run firm supply (assume w and r are unknown)

16. $F(L, K) = L^{1/2} K^{1/2}$

   a. Find STC, SAC, SMC, SVC, SAVC, SFC, and SAFC
   b. What amount of capital minimizes STC? Your answer will be a formula, not a concrete number.
   c. Suppose $w = 2$, $r = 2$, and K(bar) = 2. What amount of output minimizes SAC? What is the minimum possible SAC?
   d. Find short run firm supply (assume p, w, and r are unknown)

17. $F(L) = \ln(L)$

   a. Find the LTC, LMC, and LAC
   b. Find the long run firm supply

18. $F(L, K) = L^{1/2} + K$

   a. Find LTC. Assume w = \$1 and r = \$2. (Hint: this will be a piecewise function; find the LTC formula when $Q < 1$ and the formula when $Q > 1$)
   b. Find Q^{LR} if p = \$8, w = \$1, and r = \$10

19. $F(L, K) = 4L^{1/2} + K$

   a. Find the long run cost minimizing demands for L and K. Assume that $Q = 12$, $w = 1$, and $r = 1$
   b. Find the long run cost minimizing demands for L and K. Assume that $Q = 6$, $w = 1$, and $r = 1$

20. The total cost of labor is \$100. The total cost of capital is \$300. Revenue is three times as high as profits. What is the most you can say about profits?