This exam contains 8 short answer questions, 1 longer answer question, and 2 long answer questions. You must complete all short answer and longer answer questions; however, you only need to complete 1 of the long answer questions. Check to see if any pages are missing.

You may *not* use your books or notes on this exam. Calculators are permitted.

You are required to show your work on each problem on this exam. The following rules apply:

- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.

- **Show your work**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.

- If you need more space, use the back of the pages; clearly indicate when you have done this.

Multiple Choice: Circle the correct answer.

1. (5 points) A firm is defined as
    A. any organization that wants to make a profit.
    B. an organization that turns inputs into outputs.
    C. an organization that turns inputs into outputs in order to make a profit.
    D. a boss and employees who create goods.

2. (5 points) If $Q = K^{\frac{1}{2}} L^{\frac{4}{3}}$,
    A. MPL is decreasing, and MPK is increasing.
    B. MPL is increasing, and MPK is increasing.
    C. MPL is decreasing, and MPK is decreasing.
    D. MPL is increasing, and MPK is decreasing.

3. (5 points) A technical innovation in the production of automobiles by Ford Motor Companys for 1 million cars per year would necessarily

   A. shift the 1 million car isoquant away from the origin.
   B. shift the 1 million car isoquant toward the origin.
   C. causes 1 million cars to be produced with more capital and less labor.
   D. causes 1 million cars to be produced with more labor and less capital.

4. (5 points) If a firm wished to maximize total revenues it should produce where

   A. $P = AC$
   B. $MR = MC$
   C. $MR = 0$
   D. both a and b.

5. (5 points) A firm's total revenue is equal to

   A. total quantity produced times marginal cost.
   B. total quantity produced times price.
   C. total quantity produced times marginal revenue.
   D. market price divided by total quantity produced.

6. (5 points) In perfect competition, short run negative profit will cause

   A. some firms to exit.
   B. all firms earning negative profit to exit.
   C. some firms to enter the market.
   D. none of the above.

7. (5 points) All monopolies exist because of

   A. a firm's desire to maximize profits.
   B. failure of antitrust laws.
   C. barriers to entry.
   D. natural selection.

8. (5 points) The demand for shoes can be described with the function: $Q^D = 100 - 2P$. There is only one shoemaker in the market. His total cost can be seen as: $TC = 5Q$. How many units does the shoemaker sell?

   A. 45
   B. 50
   C. 25
   D. none of the above.

Longer Answer Question: Please answer the following. Be sure to label any graphs.

1. (30 points) Jerry sells knock-knock jokes by employing writers (L) and providing them with computers (K). His production of jokes is described by the production function, $q_{jokes} = L^{\frac{1}{2}} + K^{\frac{1}{2}}$. The market price for jokes is set at 3 dollars. Likewise, the $w = 4$ and $r = 16$.

   (a) (10 points) Write the profit function in terms of writers and computers.

   (b) (20 points) What is the total cost when Jerry produces 50 jokes? How many writers does he have to employ?

Long Answer Questions: Please answer the following. Show all work. Draw graphs where needed. Only answer 1 of the 2 questions.

1. (30 points) Guitar Geoff makes drums. His production function for drums is $q = 3K^{\frac{4}{3}}L^{\frac{2}{3}}$.

   (a) (15 points) Find the marginal cost function when the wage rate and the rental rate of capital are both equal to 1.

   (b) (15 points) Does this firm have increasing, constant, decreasing, or efficient returns to scale? Explain.

2. (30 points) The market for widgets is perfectly competitive. Suppose that widgets are normal goods. Also, the income goes up for consumers.

   (a) (15 points) Draw the market graph and the firm graph. Label the initial equilibrium A. Show the short run effect of income increasing. Label the new short run equilibrium B. What happens to price, quantity, and each firm's profit?

   (b) (15 points) On the graphs from part a, show the long run effect. Assume that the LR supply curve is upward sloping. Label the new long run equilibrium C. What happens to price, quantity, and each firm's profit?

Extra Credit: Cross out one multiple choice question. You will receive credit for that question.