

# Practice Final Exam

EC 311 - Intermediate Microeconomics

Winter 2024

**Note: This practice exam is only half-length of the actual exam**

Name: \_\_\_\_\_ 95#: \_\_\_\_\_

The maximum amount of points on this exam is 80 points. You have a total of 1h 50min (110 minutes) to complete the exam. The only items allowed on your desk at any time are a pen and/or pencil, scratch paper, a 3x5 note card, and a calculator. Everything else must be stored in your bag underneath your desk. Any form of cheating will result on a zero on the exam.

There are three sections to be completed:

- **Multiple Choice:** 5 Questions
- **Short-Answer Questions:** 2 Questions
- **Multi-Part Analysis Questions:** 1 Question

Point totals and question specific instructions are listed for each section. Please ask for clarification if a question is not clear to you.

The exam is a total of 4 pages. **Please verify you have all 4 in your exam. If you do not, let me know immediately.**

## Multiple Choice - 20 Points

Circle or "X" the answer you think most correctly answers the following questions. If you mark a choice and would like to change it, **clearly indicate which one is your correct answer**.

1. [2 points] What type of returns to scale does the production function  $F(L, K) = 5L + 13K$

A. Increasing

$$F(zL, zK) = 5zL + 13zK \rightarrow z(5L + 13K)$$

B. Decreasing

**C. Constant**

$$z(5L + 13K) = z \cdot F(L, K) \rightarrow \text{Constant}$$

D. Unable to tell from the information given

2. [2 points] What must be true for a firm to **enter** a market in the Long-Run?

A.  $P < \min\{ATC(Q^*)\}$

B.  $MC(Q^*) > ATC(Q^*)$

C.  $AVC(Q^*) < ATC(Q^*)$

**D.  $P > \min\{ATC(Q^*)\}$**

Firms must have positive profits  
which happens when  $P > \min\{ATC(Q^*)\}$

3. [2 points] A firm with a cost function of  $C(Q) = \frac{1}{2}Q^2 + 3Q$  is producing 10 units. If the price they receive is \$15, how would you describe their situation?

A. They are producing too much

B. They are profit maximizing

**C. They are not producing enough**

D. Unable to tell from the information given

$$MC = Q + 3 \quad ? \quad P$$

$$10 + 3 \quad ? \quad 15$$

$$13 \quad < \quad 15$$

Produce more

4. [2 points] Which type of competition has firms compete on price-setting instead of quantity-setting?

**A. Bertrand**

B. Cournot

C. Stackelberg

D. Cartel

5. [2 points] A firm with production function  $F(L, K) = L^{0.5}K$  that is currently employing 2 units of labor and using 8 units of capital, how many units of capital are they willing to trade in order to get one more unit of labor?

A.  $\frac{1}{2}$

B. 4

**C. 2**

D.  $\frac{1}{4}$

$$MRTS = \frac{\frac{1}{2} \cdot K}{L} = \frac{1}{2} \cdot \frac{8}{2} = \frac{4}{2} = 2$$

what is MRTS  
@  $L=2, K=8$

Willing to trade 2 units of capital  
for 1 unit of labor

## Short Answer - 30 Points

Answer the following questions to the best of your ability. For full credit, show all of your work and clearly indicate your final solution for each party by circling the answer.

6. [6 points] Bob and Jimmy are the only two restaurants open during Lobsterfest this year, they are in a Cournot Competition. Demand for lunch is given by  $P = 45 - Q$ . Bob sells  $x$  amount of burgers and he faces costs  $C_x(x) = 0.5x^2 + 40$ . Jimmy sells  $y$  amount of pizzas and faces costs  $C_y(y) = 20y$ .

What is Bob's best response function? What is Jimmy's best response function?

1. Write both Profits

$$\begin{aligned}\pi_B &= P \cdot x - C_x(x) \\ &= (45 - Q)x - 0.5x^2 - 40 \\ &= (45 - x - y)x - 0.5x^2 - 40 \\ &= 45x - x^2 - yx - 0.5x^2 - 40 \\ &= -1.5x^2 + 45x - yx - 40\end{aligned}$$

$$\begin{aligned}\pi_J &= P \cdot y - C_y(y) \\ &= (45 - x - y)y - 20y \\ &= 45y - xy - y^2 - 20y \\ &= 25y - xy - y^2\end{aligned}$$

2. Set  $\frac{\partial \pi_x}{\partial x} = 0$  & solve for  $x^*$

$$\frac{\partial \pi_x}{\partial x} \rightarrow -3x + 45 - y = 0$$

$$3x = 45 - y$$

$$BR_x = x^* = 15 - \frac{y}{3}$$

3. Set  $\frac{\partial \pi_y}{\partial y} = 0$  & solve for  $y^*$

$$\frac{\partial \pi_y}{\partial y} \rightarrow 25 - x - 2y = 0$$

$$2y = 25 - x$$

$$BR_y = y^* = 12.5 - \frac{x}{2}$$

7. [8 points] A firm faces the following Cost Function  $C(Q) = \frac{1}{6}Q^3 - 4Q^2 + 36Q + 13$ .

Below what Price ( $P$ ) will the firm shut-down? Make a graph that shows the firm's Short-Run Supply. Be sure to include the Shut-Down Condition.

$P$  is given by  $P = AVC(Q^*)$ , need to find  $AVC$  &  $Q^*$

$$1. AVC = \frac{1}{6}Q^2 - 4Q + 36$$

$$2. Q^* \text{ from } \frac{\partial AVC}{\partial Q} = 0$$

$$\frac{\partial AVC}{\partial Q} \rightarrow \frac{1}{3}Q - 4 = 0$$

$$\frac{1}{3}Q = 4$$

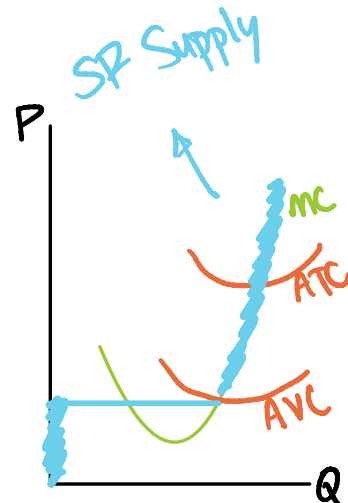
$$Q^* = 12$$

$$3. P = AVC(Q^*)$$

$$P = \frac{1}{6}(12)^2 - 4(12) + 36$$

$$P = \frac{1}{6}(144) - 48 + 36$$

$$P = 24 - 48 + 36 = 12$$



## Multi-Part Analysis - 30 Points

Answer the following questions to the best of your ability. For full credit, show all of your work and clearly indicate your final solution for each party by circling the answer.

8. (30 points) Suppose the market for thrifted clothes in Springfield is perfectly competitive. The thrift firms are identical and have long-run cost functions given by  $C(Q) = 10Q^3 - 100Q^2 + 300Q$ . Market demand is given by  $Q_D = 5,000 - 90P$ .

(a) [3 points] What is the marginal cost curve for each firm in this market?

$$MC = 30Q^2 - 200Q + 300$$

(b) [3 points] What is the average total cost curve for each firm in this market?

$$ATC = \frac{C(Q)}{Q} = \frac{10Q^3 - 100Q^2 + 300Q}{Q}$$

$$ATC = 10Q^2 - 100Q + 300$$

(c) [10 points] Find the long-run equilibrium price for this market

1. Find  $Q^*$  from  $MC = ATC$

$$30Q^2 - 200Q + 300 = 10Q^2 - 100Q + 300$$

$$20Q^2 = 100Q$$

$$Q^2 = 5Q$$

$$Q^* = 5$$

2.  $P^* = MC(Q^*)$

$$P^* = 30(5)^2 - 200(5) + 300$$

$$P^* = 30(25) - 1000 + 300$$

$$P^* = 750 - 1000 + 300$$

$$P^* = 50$$

(d) [5 points] What is the equilibrium level of market output?

$$Q_D = 5,000 - 90P^*$$

$$Q_D = 5,000 - 90(50) = 5,000 - 4,500$$

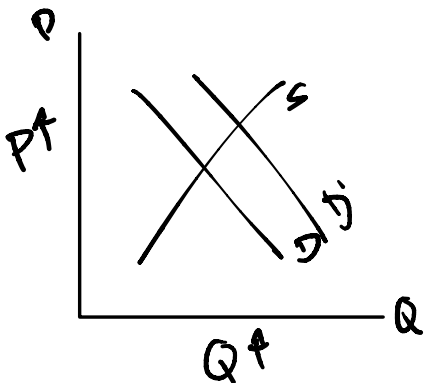
$$Q_D = 500$$

(e) [5 points] How many firms are in the market in the long-run equilibrium?

$$Q_D = Q_S \cdot N \rightarrow N = \frac{Q_D}{Q_S} = \frac{500}{5} = 100$$

$$N = 100$$

(f) [4 points] Suppose market demand increases. What do you expect will happen to  $Q^*$ ,  $P^*$ , and the number of firms? For each of these, mention if it will increase, decrease, or stay the same and explain your reasoning. Address both the short-run and long-run dynamics. A graph may also help your explanation.



$Q^*$  will increase due to higher demand  
 $P^*$  will also increase

This causes  $\pi$  to be positive in SR.  
 Positive profits will make new firms enter in LR which will  $\uparrow Q$ .

Price goes back down to original  $P^*$

SR	LR
$N =$	$N \uparrow$
$Q \uparrow$	$Q \uparrow$
$P \uparrow$	$P =$