Instructions:

- **This is a 60-minute examination.**
- **Write all answers in the blue books provided. Show all work. Use diagrams where appropriate and label all diagrams carefully.**
- **Write your name and your Recitation Instructor's name in every blue book that you use.**
- **This exam is given under the rules of Penn's Honor system.**
- **All blue books, blank or filled, must be handed in at the end of this exam. No blue books may be taken from the room.**
- The use of Programmable Calculators is in violation of Departmental rule. It is strictly forbidden!

The Midterm has 2 parts.
Part 1 consists of 9 multiple-choice questions. Please write you answers in blue book 1.
Part 2 consists of 2 short answer questions. Please use a separate blue book for each answer.

Part I: Multiple Choice Questions (Best 8 out of 9: 4 points each/32 points total):

1. Mrs. X spends all her income on Apples and Bananas. If the price of both goods rises by 10 percent, which of these statements are correct?

    I.   If we give Mrs. X 10 percent more income, she would be as happy as before the price increase.
    II.   After the price increase, she will consume goods Apples and Bananas in the same proportion as before.
    III. After the price increase, she will consume more of the cheaper good.

    a. I only
    b. I and II
    c. I, II and III
    d. None of the above

2. In the standard labor-leisure model from class, the absolute value of the slope of the budget line is equal to

    a. the wage rate
    b. income
    c. the opportunity cost of an hour spent on leisure
    d. both (a) and (c) are correct
    e. both (b) and (c) are correct
    f. (a), (b), and (c) are all correct
    g. none of the above are correct

3. Consider the standard labor-leisure model from class. Suppose that wages go up and we observe that time spent on leisure activities increases. This implies that

    a. the substitution effect dominated the income effect
    b. the income effect dominated the substitution effect
    c. leisure is a normal good
    d. labor supply will be upward sloping
    e. both (a) and (c) are correct
    f. both (c) and (d) are correct
    g. both (b) and (c) are correct
    h. both (b) and (d) are correct

    4. Based on the information below, what are the Total Fixed Costs for this firm?

Quantity	TC	VC	MC
4		15	
5	35		5

    a. 0
    b. 6
    c. 15
    d. 30

5. Which of the following statements are true?

    I. When ATC is decreasing, MC is decreasing as well.
    II. When AVC is decreasing, MC is decreasing as well.

    a. Only I
    b. Only II
    c. Both I and II.
    d. Neither I nor II.

6. Which of the following is **not** true of a single-price monopolist:

    a. They produce the quantity at which marginal revenue equals marginal cost.
    b. They will produce where demand is elastic.
    c. Even with a government tax or subsidy, they will never produce at the socially optimal equilibrium.
    d. The marginal revenue curve is downward sloping.

7. The market for apples is perfectly competitive and is in long-run equilibrium. The price of fertilizer, a variable input used in apple growing, rises. Which of the following is true of the price of apples?

   a. In the short run prices will rise, then return to their previous level in the long run.
   b. In the short run prices will fall, then return to their previous level in the long run.
   c. In the long run prices will rise.
   d. In the long run prices will fall.

8. Loretta claims that the furniture industry is **not** monopolistically competitive. Which of the following statement would support her claim?

   a. Chairs are sold with a mark up over their marginal cost of production.
   b. Beds-To-Go, a manufacturer of beds, made economic profits last year.
   c. Kitchen tables come in many shapes and sizes.
   d. Most factories that make furniture are closed over the weekend.
   e. It is extremely costly to start a new business in the furniture industry.

9. In Istanbul's Great Bazaar the shopkeepers haggle & bargain over prices with each customer separately. Which of the following is **False**?

   a. This is an example of price discrimination.
   b. Shopkeepers do this to increase their produce surplus relative to charging everyone the same price.
   c. This is likely to decrease consumer surplus relative to charging everyone the same price.
   d. This will increase Dead Weight Loss relative to charging everyone the same price.

   Answers:

   1. a
   2. d
   3. g
   4. c
   5. d
   6. c
   7. c
   8. e
   9. d

Q1. (34 points)
Consider the market for pencil erasers, which (let's assume) is perfectly competitive.
Each firm has the following cost structure:
$$MC = 4q + 4$$
$$VC = 2q^2 + 4q$$
$$FC = 32$$

    a. At a price of $16 per case, what quantity will a typical firm produce? (Assume the firm chooses a positive quantity.) What are its revenues, total costs, and profits?

Answer:
Setting MC=P we get $4q + 4=16$ or q=3, rev=16*3=48, costs= 32+18+12=62, profits=-14.

Points: 8
q=3: 2 points (1 method, 1 result)
Revenue: 2 points (1 method, 1 result)
Total Costs: 2 points (1 method, 1 result)
Profits: 2 points (1 method, 1 result)

    b. Suppose the firm did not produce anything at all, what would its profits be?

Answer:
At q=zero, profits=Rev-TC=zero -FC=-32

Points: 4
Profits=-32 (2 method, 2 result)

    c. Would the firm be better off shutting down instead of producing the quantity found in (a)? Explain why or why not.

Answer:
The firm is better off producing as this decreases their losses.

Points: 4
Better off producing: 2 points
As this decrease losses *or* because P>AVC *or* TR>TVC: 2 points

Now suppose market demand is given by $Q^D = 70 - P + I$, where *I* represents consumers' income.

    d. Suppose $I = 6$. How many units will each firm produce in the long run? What will the market price be? How many firms are active in the market in the long run?

Answer:In the long run the firms in the market will produce at zero profits ➔where TR=TC➔P=ATC. But the firm are also maximizing profits and producing where P=MC. In other words we must find the point of minimum ATC where MC=ATC.
Setting $4q+4=(32+2q^2 + 4q)/q$ we get q=4.
Plugging into P=MC we get P=20.

Plugging into demand curve we get Q=56.
So the number of firms, n, is Q/q=56/4=14.

Points: 8
Q^{LR}=4: 2 points (1 method, 1 result)
P^{LR}=20: 2 points (1 method, 1 result)
N=14: 2 points (2 for finding Q, 1 for N=Q/q, 1 result)

    e.   Now suppose consumers' income increases to $I = 10$. How does this affect your answer to (d)? Show any necessary calculations and explain.

Answer:
The long run conditions from the point of view of the firm have not changed. In the long run the firms in the market will produce at zero profits ➔where TR=TC➔P=ATC. But the firm are also maximizing profits and producing where P=MC. In other words we must find the point of minimum ATC where MC=ATC.
Setting *4q+4=(32+2q² + 4q)/q* we get q=4 as before.
Plugging into P=MC we get P=16 as before.
The difference is in Q, now plugging P=20 into demand curve we get Q=60.
So the number of firms, n, is Q/q=60/4=15.

Points: 6
q^{LR}=4: 2 points (1 method, 1 result).
P^{LR}=20: 2 points (1 method, 1 result)
N=15: 2 points (1 method, 1 result)

***Note*: It is enough to state something like LR price & quantity produce by each firm is independent of demand to get full credit for q & P.**

    f.   Clair, a market analyst for Eraser Ink, one of the competitive firms active in the industry, says: "No matter what the income level is, the price in the long run is the same. This implies that erasers are neither a normal nor an inferior good." Is Clair correct in her analysis? Explain briefly which parts, if any, of her statement are correct or incorrect.

    Answer:
    Clair is correct that the change in income does not, in the long run, effect market price. But she is incorrect in her implication that this means the good is not a normal good. A normal good is one for which a change in income increases quantity. Indeed as the market demand suggests when income increases so does market demand.

Points: 4
2 for stating that P^{LR} is constant irrespective of income: 2 points
2 for understanding that the good is still normal as E(I)>zero.: 2 points

Q2. (34 points)

Utility services like electricity typically have high fixed costs, and low marginal costs. This question asks you to analyze what would happen if the electricity market were to have lots of firm in it and to explain why this will not be the case.

Assume that the marginal cost of producing electricity is given by the equation:
$$MC(Q) = 5,$$
where Q refers to the quantity of electricity.

    a. Plot the marginal cost curve, along with an average total cost curve that is consistent with the marginal cost curve, and the fact that there are high fixed costs.

Answer:
MC constant at 5. ATC always declining and getting closer to it.

Points: 6
MC flat at 5: 2
ATC falling to it: 4

Let us start by assuming that there were many firms in this electricity industry and they are all price takers.

    b. Explain why the industry supply curve under such a set up will be given by $P(Q) = 5$.

Answer:
Each firm in a competitive market maximizes profits by producing where P=MC so we get all firms producing at P=5.

Points: 3
Looking for intuition of P=MC

    c. Plot the industry supply curve, and a typical industry demand curve. What will the equilibrium price be in such a set up?

Answer:
Downward sloping demand curve and perfectly elastic supply curve at P=5.
Equilibrium price will be 5.

Points: 4
Downward demand: 1
Elastic supply: 1
Equilibrium at 5:2

    d. Consider a typical firm in this set up. What are the profits or losses that this firm makes? Should we expect exit or entry in this industry?

Answer:
At P=5 no matter how many units the firm produces it will be covering its variable costs but not any of its fixed costs. Losses=FC. We should expect exit from this industry.

Points: 6
Losses=-FC: 4 (partial credit of 2 if state intuition that only variable costs are covered or similar)
Exit: 2

In the actual electricity market we do not find a multitude of parallel firms.

  e. How many firms would you expect to operate in this industry in the long run? What is such a market structure called?

Answer:
We would expect only one firm in this industry. This is Natural Monopoly.

Points: 5
1 firm: 2
Natural Monopoly: 3 (need to say NATURAL monopoly to get these points!)

  f. For the market structure that you mentioned in part (e), show in a graph the level of output that a firm operating in this market structure produces. Clearly mark out in your graph the profits that such a firm makes. Assume no regulation.

Answer:
The firm will produce where MR=MC and set a price higher than MC.
Profits are the area between P & ATC at the profits maximizing quantity * quantity.

Points: 6
Q where MC=MR: 2
Profits: 4 (2 for finding P, 2 for marking (P-ATC)*Q)

  g. Will the output produced in such a market structure be efficient? Explain why or why not?

Answer:
The output is inefficient as P=MB>MC and therefore there is DWL.

Points: 4
Points for explanation using either Dead Weight Loss or production where MB>MC.