Microeconomics, marginal cost profit maximization, final exam practice problems

(The attached PDF file has better formatting.)

*Question 1.1: Marginal Revenue

Assume the demand curve is linear.

- At P = $100, total revenue is $200,000.
- At P = $80, total revenue is $240,000.

What is the marginal revenue per unit at P = $120?

A. 80
B. 100
C. 120
D. 140
E. 160

Answer 1.1: B

The demand curve is $Q = \alpha - \beta \times P$

- At P = $100, total revenue = $200,000, so Q = 2,000
- At P = $80, total revenue = $240,000, so Q = 3,000

We use these values to solve for α and β in the demand curve.

- $2,000 = \alpha - \beta \times 100$
- $3,000 = \alpha - \beta \times 80$

$\Rrightarrow 1,000 = 20 \beta \Rrightarrow \beta = 50$ and $\alpha = 7,000$

$Q = 7,000 - 50P$, so at P = 120, Q = 1,000.

We used a demand curve as Q in terms of P, so we convert to P in terms of Q before finding the marginal revenue curve.

$P = 7,000 / 50 - 0.02Q = 140 - 0.02Q$

The total revenue curve is $TR = 140Q - 0.02Q^2$.

The marginal revenue curve is $MR = 140 - 0.04Q$.

At P = $120, Q = 1,000, and marginal revenue is $140 - 0.04 \times 1,000 = \$100$

*Question 1.2: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What is the marginal revenue curve facing the firm?

A. MR = $130Q – 5Q^2$
B. MR = $130 – 5P^2$
C. MR = $130Q – 10Q^2$
D. MR = $130 – 10Q$
E. MR = $130P – 5P^2$

Answer 1.2: D

Total revenue = $130Q – 5Q^2$
Marginal revenue = ∂(Total revenue)$/\partial Q$ = $130 – 10Q$

*Question 1.3: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What is the quantity produced by the firm? (Assume a continuous distribution.)

A. 2
B. 6
C. 10
D. 14
E. 18

Answer 1.3: C

Set marginal revenue = marginal cost:

$130 – 10Q = 20 + Q \Rightarrow 110 = 11Q$
$110 = 11Q \Rightarrow Q = 10 \Rightarrow P = 80$

*Question 1.4: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What is the price charged by the firm? (Assume a continuous distribution.)

A. 50
B. 60
C. 70
D. 80
E. 90

Answer 1.4: D

Set marginal revenue = marginal cost:

$130 - 10Q = 20 + Q \Rightarrow 110 = 11Q$
$110 = 11Q \Rightarrow Q = 10 \Rightarrow P = 80$

*Question 1.5: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What are the variable costs of the firm? (Assume a continuous distribution.)

A. 200
B. 250
C. 300
D. 350
E. 400

Answer 1.5: B

variable costs = $\int 20 + Q \, dQ$ from 0 to 10 = $20Q + \frac{1}{2} Q^2$ from 0 to 10 $\Rightarrow$

variable costs = $20 \times 10 + \frac{1}{2} \times 100 = 250$

*Question 1.6: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What are the total costs of the firm? (Assume a continuous distribution.)

A. 200
B. 250
C. 300
D. 350
E. 400

Answer 1.6: C

variable costs = ∫ 20 + Q dQ from 0 to 10 = $20Q + \frac{1}{2} Q^2$ from 0 to 10 ⇒

variable costs = 20 × 10 + ½ × 100 = 250

total costs = 250 + 50 = 300

*Question 1.7: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What is the total revenue of the firm? (Assume a continuous distribution.)

A. 400
B. 500
C. 600
D. 700
E. 800

Answer 1.7: E

130 – 10Q = 20 + Q ⇒ 110 = 11Q
110 = 11Q ⇒ Q = 10 ⇒ P = 80

Total revenue = 10 × 80 = 800

*Question 1.8: Profit Maximization

A firm faces a demand curve of P = 130 – 5Q. The marginal cost for this firm is 20 + Q, and fixed costs are 50. The firm produces a quantity and charges a price to maximize profits. What is the net profit of the firm? (Assume a continuous distribution.)

A. 400
B. 500
C. 600
D. 700
E. 800

Answer 1.8: B

130 – 10Q = 20 + Q ⇒ 110 = 11Q
110 = 11Q ⇒ Q = 10 ⇒ P = 80

Total revenue = 10 × 80 = 800

variable costs = ∫ 20 + Q dQ from 0 to 10 = $20Q + \frac{1}{2} Q^2$ from 0 to 10 ⇒

variable costs = 20 × 10 + ½ × 100 = 250

total costs = 250 + 50 = 300

Net profit = 800 − 300 = 500