Practice Problems – Perfect Competition

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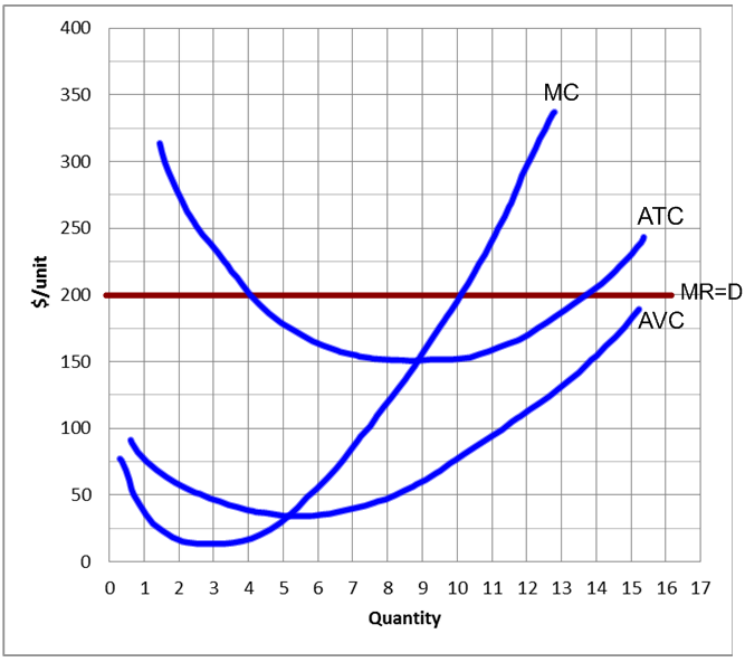
1. Use the graph below to answer the following questions:



   a. What is the current market price for this product?

   b. Mark on the graph the profit-maximizing output level for this firm.

   c. Is this firm making a profit or losing money? *Shade in* the area of profit or loss.

   d. **Calculate** the profit for this firm.

   e. Suppose the market price fell to $125. What should this firm do?

2. The table below presents cost information for a hypothetical perfectly competitive firm. **Calculate** Average Total Cost, Average Variable Cost and Marginal Cost for this firm. (ATC = TC/Q, AVC = TVC/Q, MC = ΔTC/ΔQ).

Q	TVC	TC	ATC	AVC	MC
0	0	30			
1	8	38			
2	14	44			
3	17	47			
4	18	48			
5	23	53			
6	33	63			
7	47	77			
8	65	95			
9	90	120			
10	130	160			

   a. What is this firm's **total fixed cost**?

   b. What is the profit maximizing level of output if P = $10?

   c. Calculate the firm's profit (or loss) when P = $10. [Note: profit = Q * (P - ATC)]

   d. What is the LOWEST price at which this firm will produce a positive quantity of output?

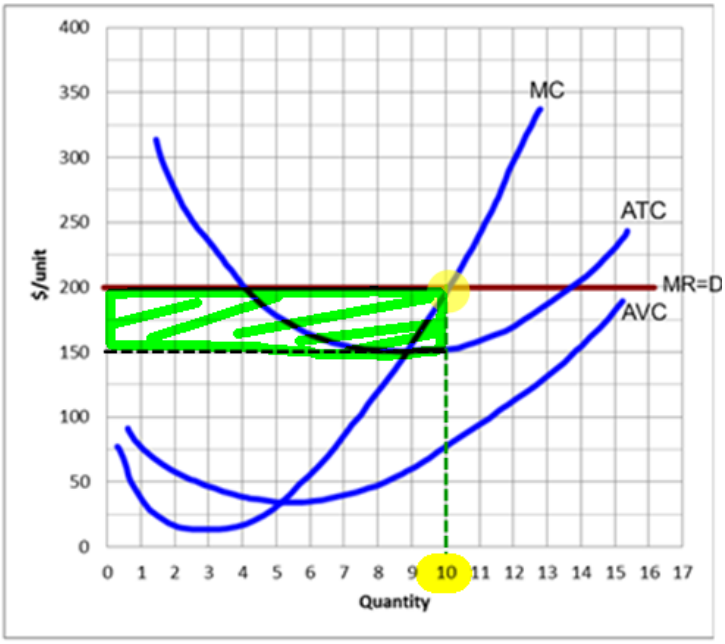
3. You run a small repair shop and have estimated that in the short run, your monthly costs can be described by the equation TC = $800 + 2Q^2 + 4Q$.
   Your marginal cost curve can be expressed as $MC = 4Q + 4$
   Your average total costs can be expressed as $ATC = 800/Q + 2Q + 4$
   The price for a typical repair job is $200.

   What is your profit-maximizing number of repairs each month?
   What is your monthly profit or loss?

4. Sketching the quantity decision for perfect competition
   Sketch a graph of a perfectly competitive firm with "typical" cost curves in which the firm is losing money but chooses to produce q* rather than shutting down. Illustrate the firm's losses.

ANSWERS: Do not peek until you have worked through all of the problems!

1. Use the graph below to answer the following questions:
   a. What is the market price for this product?
   $200
   b. Mark on the graph the profit-maximizing output level for this firm.
   Q = 10
   c. Is this firm making a profit or losing money?
   Green shading shows profit (P>ATC).
   d. Calculate the profit for this firm.
   Profit = Q * (P – ATC)
   = 10 * (200-150) = 10*50 = $500
   e. Suppose the market price fell to $125. The firm would reduce quantity to 8. Price is still above AVC; the firm would lose money but would not shut down.



2. The table below presents cost information for a hypothetical perfectly competitive firm. **Calculate** Average Total Cost, Average Variable Cost and Marginal Cost for this firm. (ATC = TC/Q, AVC = TVC/Q, MC = ΔTC/ΔQ).

Q	TVC	TC	ATC	AVC	MC
0	0	30			
1	8	38	38.0	8.0	8
2	14	44	22.0	7.0	6
3	17	47	15.7	5.7	3
4	18	48	12.0	4.5	1
5	23	53	10.6	4.6	5
6	33	63	10.5	5.5	10
7	47	77	11.0	6.7	14
8	65	95	11.9	8.1	18
9	90	120	13.3	10.0	25
10	130	160	16.0	13.0	40

a. What is this firm's **total fixed cost**?
Fixed cost = $30. (Calculate this as TC – TVC or take note that when Q=0, TC = $30)

b. What is the profit maximizing level of output if P = $10?
Set P = MC. When P=10, should choose **Q = 6**

c. Calculate the firm's profit (or loss) when P = $10. [Note: profit = Q * (P - ATC)]
Profit = 6 * (10 – 10.5) = **-3**. The firm is losing money.

d. What is the LOWEST price at which this firm will produce a positive quantity of output? The firm will produce q* as long as P≥AVC. The minimum point of AVC is 4.5, so the lowest possible price at which the firm will produce q* is $4.5.

3. TC = $800 + 2Q^2 + 4Q$.
   MC = 4Q + 4
   ATC = 800/Q + 2Q + 4
   P= $200.
   You maximize profits by choosing the quantity at which the price (200) equals marginal cost (4Q + 4).

   4Q + 4 = 200
   4Q = 200 – 4 = 196
   Q = 196/4 = **49** repairs per month

Profit = Q(P – ATC)

Find ATC by plugging your profit-maximizing Q into the ATC equation above:
ATC = 800/49 + 2(49) + 4 = 118.33

Profit = 49 * (200 – 118.33) = $4002

Note: you can also find profit by calculating Total Revenue – Total Cost. TR = price * quantity = 200 * 49. Calculate TC from the equation above. You will get the same result.

4. Sketching the quantity decision for perfectly competitive firm losing money: