

## Problem Set #9-Key

Sonoma State University

Economics 305-Intermediate Microeconomic Theory

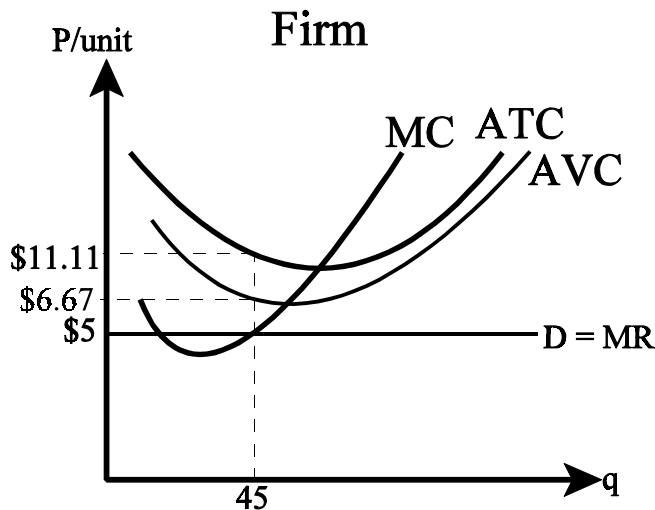
Dr. Cuellar

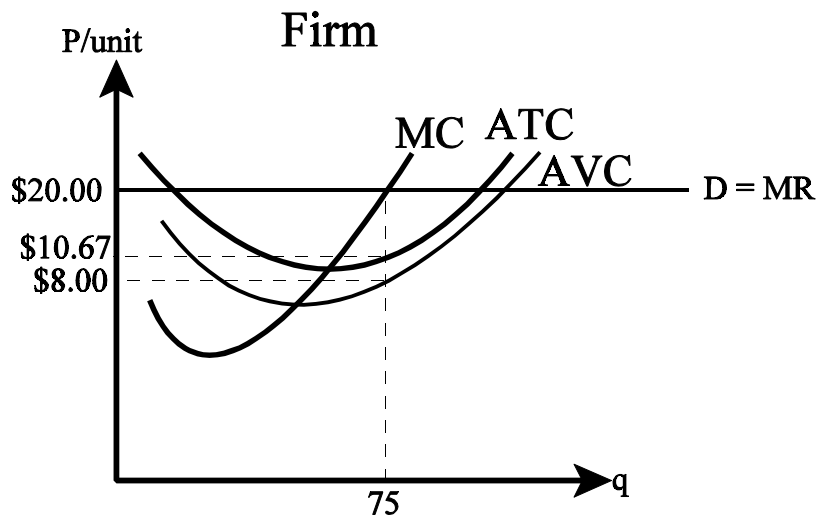
Consider the following daily product and cost schedule for a profit maximizing firm operating in a perfectly competitive market.

Labor	Product	MP	AP	FC	VC	TC	MC	ATC	AVC
0	0			200	0	200			
1	10	10	10	200	100	300	10.00	30.00	10.00
2	25	15	12.5	200	200	400	6.67	16.00	8.00
3	45	20	15	200	300	500	5.00	11.11	6.67
4	60	15	15	200	400	600	6.67	10.00	6.67
5	70	10	14	200	500	700	10.00	10.00	7.14
6	75	5	12.5	200	600	800	20.00	10.67	8.00
7	75	0	10.714	200	700	900		12.00	9.33
8	70	-5	8.75	200	800	1000	-20.00	14.29	11.43

Assume the only variable cost is labor which is paid a rate of \$100 per day.

- (1) Complete the above cost schedule.
- (2) If the prevailing market price of output is \$5 per unit, what is the profit maximizing output?  
The competitive firm produces where  $MC = P$ , so  $q = 45$ .
- (3) At the profit maximizing output in (2), what is the per unit cost of production?  
 $ATC(45) = \$11.11$
- (4) At the profit maximizing output in (2), what is the per unit labor cost?  
 $AVC(45) = \$6.67$
- (5) At the profit maximizing output in (2), what is the per unit profit or loss?  
 $\pi/q = P - ATC$ , so the per unit profit  $\pi/q = \$5 - \$11.11 = -\$6.11$
- (6) At the profit maximizing output in (2), what is the total profit or loss?  
The total profit is  $\pi = (-\$6.11)(45) = -\$274.95$ .
- (7) Show your answers for questions 2-6, graphically. You need only graph your answers by hand using standard "U" shaped cost curves.





- (8) In the short run, at a market price of \$5 per unit, should this firm continue operating or should the firm shut down? Explain your answer.

Since price is less than minimum AVC, the firm should shut down.

- (9) If the prevailing market price of output is \$20 per unit, what is the profit maximizing output?

Again setting  $MC = P$ , the firm should produce 75 units of output.

- (10) At the profit maximizing output in (9), what is the per unit cost of production?

$ATC(75) = \$10.67$ .

- (11) At the profit maximizing output in (9), what is the per unit labor cost?

$AVC(75) = \$8.00$ .

- (12) At the profit maximizing output in (9), what is the per unit profit or loss?

$\pi/q = P - ATC$ , so the per unit profit  $\pi/q = \$20 - \$10.67 = \$9.33$

- (13) At the profit maximizing output in (9), what is the total profit or loss?

The total profit is  $\pi = (\$9.33)(75) = \$699.75$ .

- (14) Show your answers for questions 9-13, graphically. You need only graph your answers by hand using standard “U” shaped cost curves.

- (15) What is the minimum price needed by the firm to break even (i.e., earn zero economic profits)? Explain.

The firm breaks even (i.e., earns zero economic profits) when price is equal to minimum ATC which is \$10.

- (16) What is the shutdown price? Explain.

The firm should shut down when price falls below minimum AVC which is \$6.67.