Chapter 9: Monopoly, Oligopoly, and Monopolistic Competition

Wednesday, July 14

QUESTION 1 (quantity supplied)

Suppose that every firm in a given market has the same cost structure, described as follows:

$MC = 20 + .5Q$
$VC = 20Q + .25Q^2$
$FC = 900$
$TC = 900 + 20Q + .25Q^2$

If the market price is 60, then how many units will each firm choose to supply?

A) 60 B) 70 C) 80 D) 90 E) 100

answer to question 1

Suppose that every firm in a given market has the same cost structure, described as follows:

$MC = 20 + .5Q$
$VC = 20Q + .25Q^2$
$FC = 900$
$TC = 900 + 20Q + .25Q^2$

If the market price is 60, then how many units will each firm choose to supply?

$20 + .5Q = 60$
$.5Q = 40$
$Q = 80$

A) 60 B) 70 **C) 80** D) 90 E) 100

QUESTION 2 (profits)

Suppose that every firm in a given market has the same cost structure, described as follows:

$MC = 20 + .5Q$
$VC = 20Q + .25Q^2$
$FC = 900$
$TC = 900 + 20Q + .25Q^2$

The market price is 60, so each firm chooses to produce 80 units. How much profit does each firm get?

A) 600 **B) 700** **C) 800** **D) 900** **E) 1000**

answer to question 2

Suppose that every firm in a given market has the same cost structure, described as follows:

$MC = 20 + .5Q$
$VC = 20Q + .25Q^2$
$FC = 900$
$TC = 900 + 20Q + .25Q^2$

The market price is 60, so each firm chooses to produce 80 units. How much profit does each firm get?

$\Pi = P \times Q - TC$
$\Pi = 60 \times 80 - [900 + 20(80) + .25(80)^2]$
$\Pi = 4800 - 4100$
$\Pi = 700$

A) 600 **B) 700** C) 800 D) 900 E) 1000

answer to question 2, continued

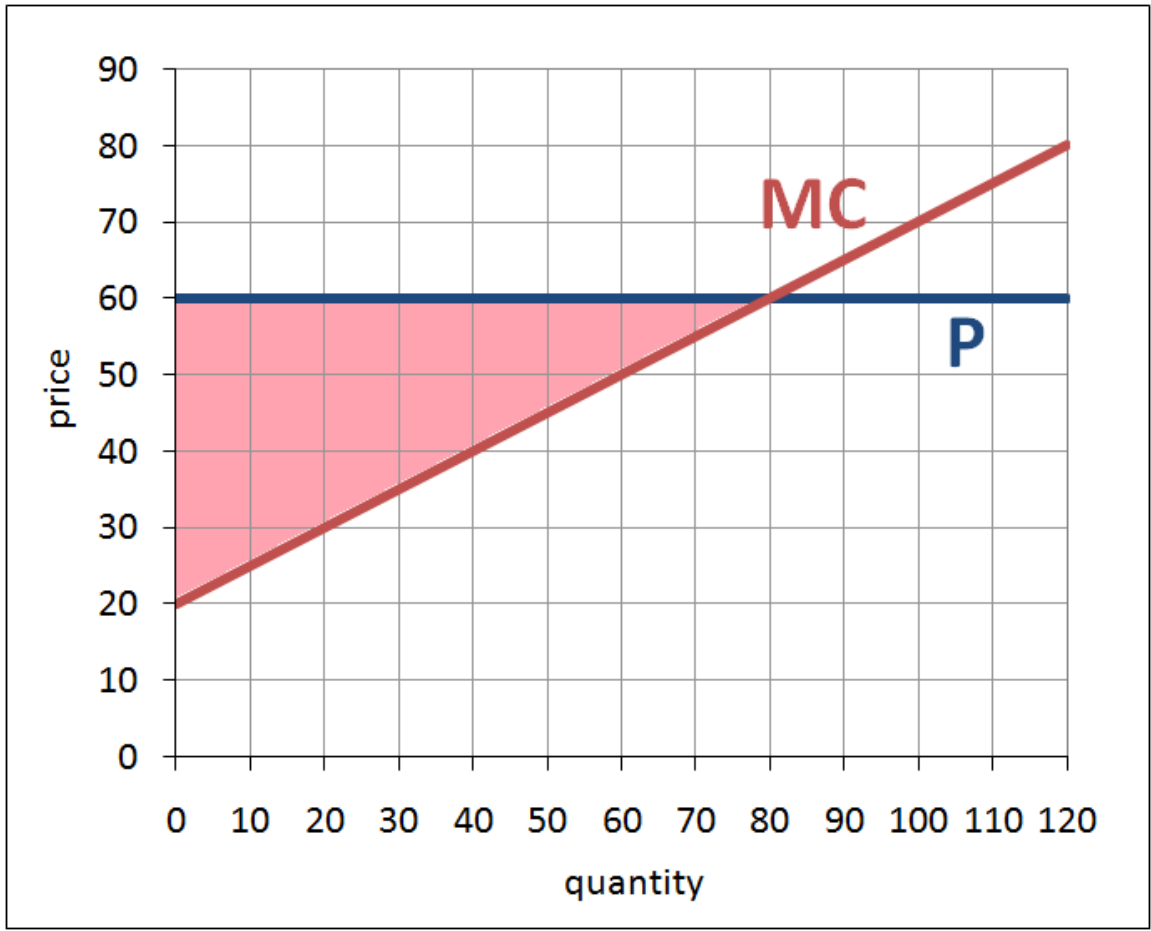
Suppose that every firm in a given market has the same cost structure, described as follows:

MC = 20 + .5Q
FC = 900
P = 60

VC = 20Q + .25Q²
TC = 900 + 20Q + .25Q²

PS = (.5)(80)(40)
PS = 1600

Π = PS – FC
Π = 1600 – 900
Π = 700



QUESTION 3 (average total cost)

Suppose that every firm in a given market has the same cost structure, described as follows:

$MC = 20 + .5Q$

$FC = 900$

$P = 60$

$VC = 20Q + .25Q^2$

$TC = 900 + 20Q + .25Q^2$

$Q_S = 80$

Which is the correct average total cost function?

A) $20/Q + .5$
B) $20Q + .5Q^2$
C) $900/Q + 20 + .25Q$
D) $880 + 19.5Q + .25Q^2$
E) $900 + 20 + .5Q$

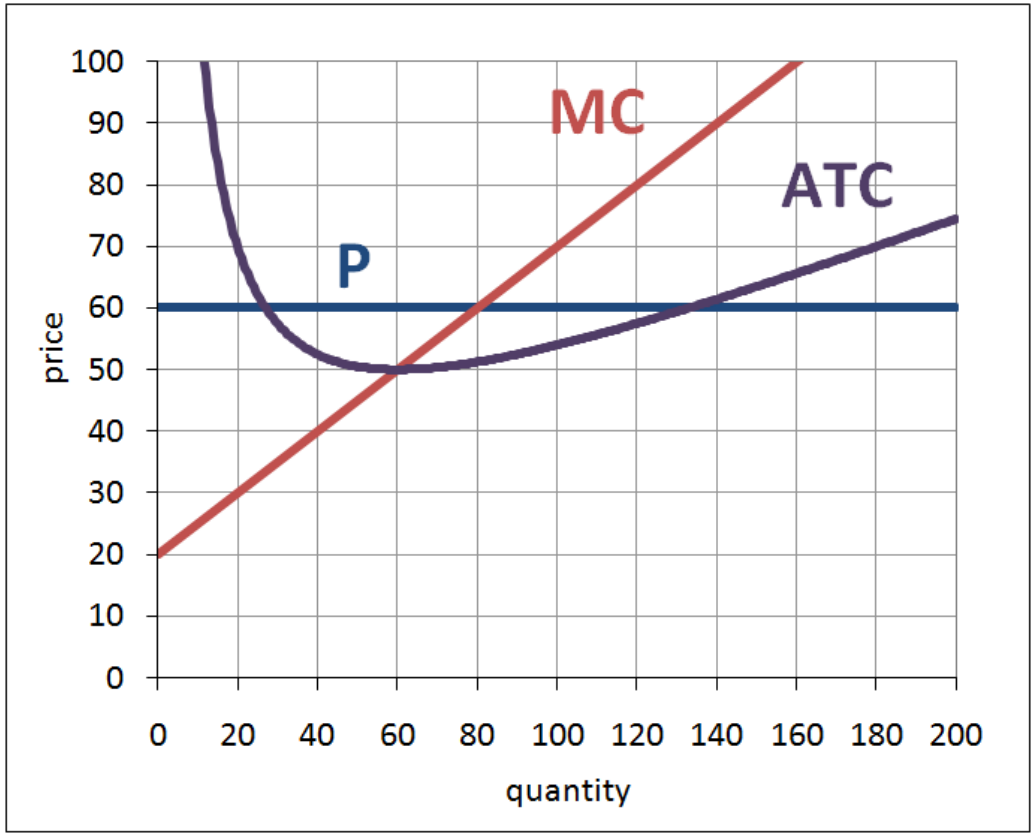
answer to question 3

Suppose that every firm in a given market has the same cost structure, described as follows:

MC = 20 + .5Q
FC = 900
P = 60

$VC = 20Q + .25Q^2$
$TC = 900 + 20Q + .25Q^2$
$Q_s = 80$

ATC = 900/Q + 20 + .25Q



TYPES OF IMPERFECT COMPETITION

1. Monopoly: Only one seller

2. Oligopoly: Only a few sellers

3. Monopolistic competition: Many sellers, but each with some product differentiation.

TYPES OF IMPERFECT COMPETITION: TABLE

	# of firms	product differen-tiated?	seller can affect price?
perfect competition	many	no	no
monopoly	one	(N/A)	yes
oligopoly	a few	sometimes	yes
monopolistic competition	many	yes	yes

PERFECT COMPETITION, DISCRETE

buyers' benefit

Q	TB	MB
1	15	15
2	27	12
3	36	9
4	42	6
5	45	3
6	45	0

sellers' cost

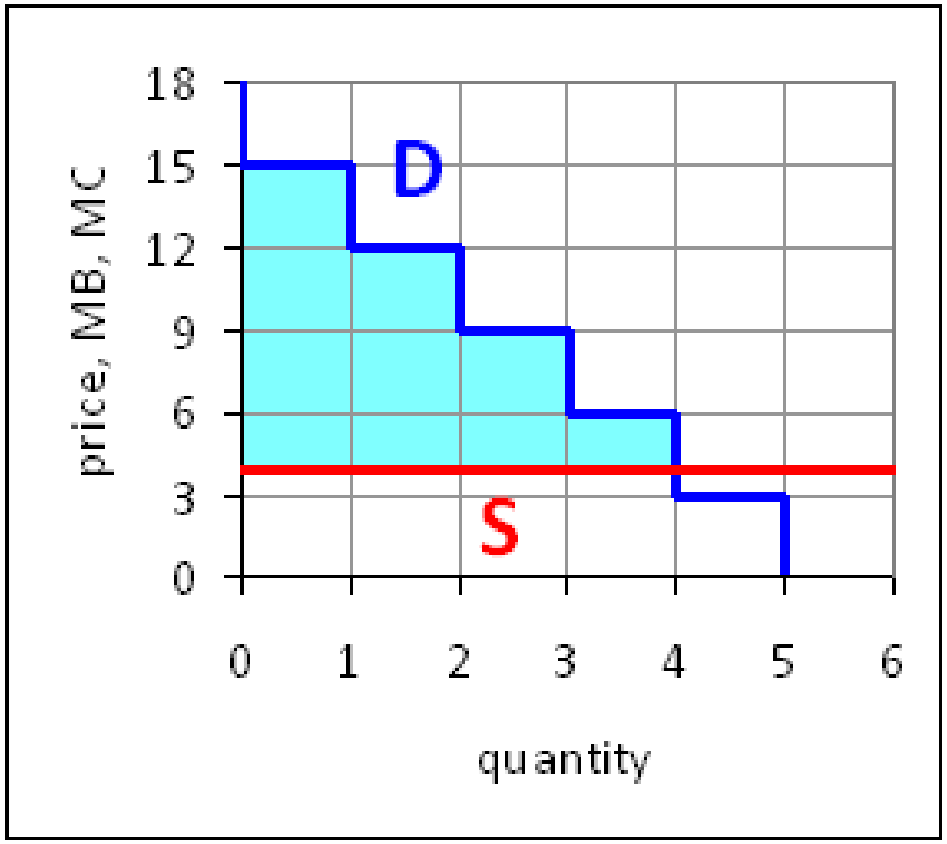
Q	TC	MC
1	4	4
2	8	4
3	12	4
4	16	4
5	20	4
6	24	4

In this market, buyers have decreasing marginal benefit, and sellers have constant marginal cost (to keep things simple). If the market is perfectly competitive, what happens in equilibrium?

PERFECT COMPETITION, DISCRETE: GRAPH

Q	MB
1	15
2	12
3	9
4	6
5	3
6	0

Q	MC
1	4
2	4
3	4
4	4
5	4
6	4



In equilibrium, P = 4, Q = 4, consumer surplus is (15 - 4) + (12 - 4) + (9 - 4) + (6 - 4) = 26, and producer surplus is zero.

MONOPOLY, DISCRETE

Q	MB
1	15
2	12
3	9
4	6
5	3
6	0

Q	TC	max. price	TR = P×Q	Π = TR–TC
1	4	15	15	11
2	8	12	24	16
3	12	9	27	15
4	16	6	24	8
5	20	3	15	-5
6	24	0	0	-24

Now, imagine that there is only one seller. The seller needs to charge the same price for all units, so the price he can get varies with how many units he seeks to sell. His profit-maximizing quantity is 2, compared to 4 if the market is competitive.

MONOPOLY, DISCRETE: MARGINAL REVENUE

Q	TC	MC	max. price	R = P×Q	MR	Π = R–TC
1	4	4	15	15	15	11
2	8	4	12	24	9	16
3	12	4	9	27	3	15
4	16	4	6	24	-3	8
5	20	4	3	15	-9	-5
6	24	4	0	0	-15	-24

Marginal revenue is the change in total revenue that results from a one-unit increase in output.

$MR = \Delta R/\Delta Q$

Although the maximum price of the 3rd unit (9) is still greater than MC (4), the marginal revenue (3) is not. The last unit with MR>MC is the 2nd.

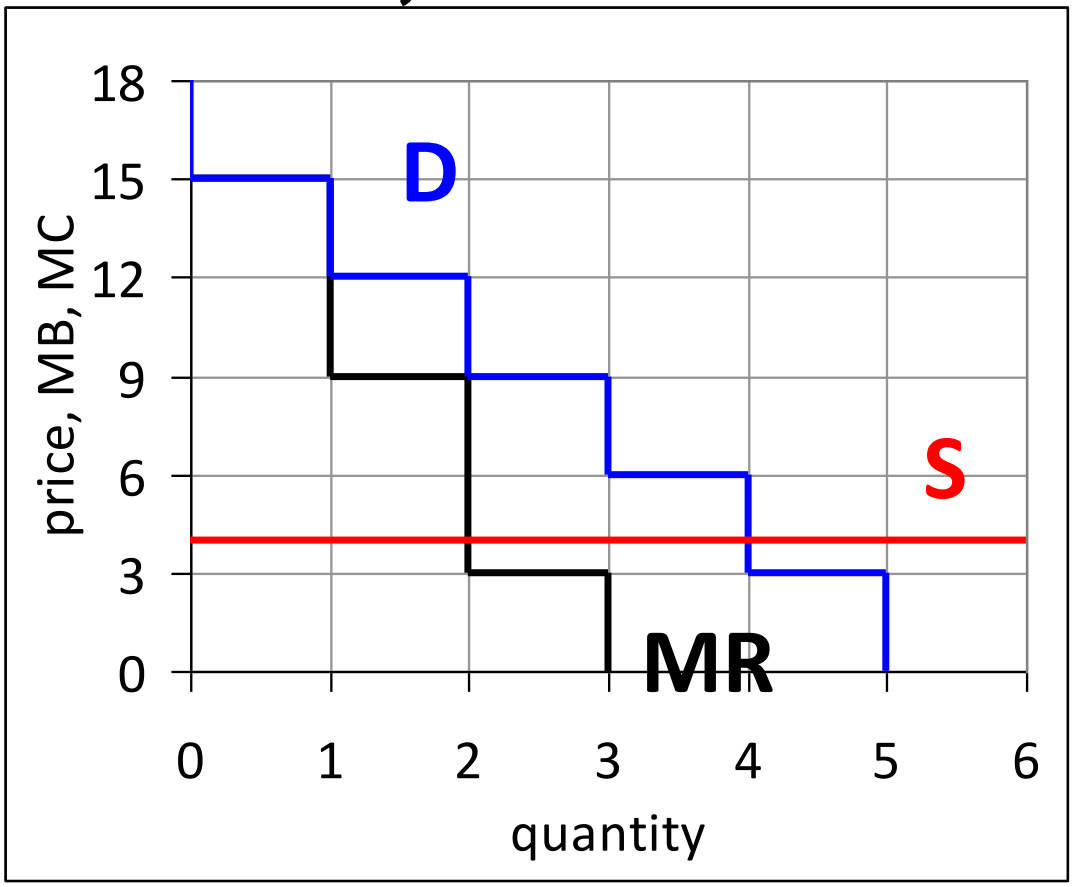
MONOPOLY, DISCRETE: MARGINAL REVENUE

Q	TC	MC	max. price	R = P×Q	MR	Π = R–TC
1	4	4	15	15	15	11
2	8	4	12	24	9	16
3	12	4	9	27	3	15
4	16	4	6	24	-3	8
5	20	4	3	15	-9	-5
6	24	4	0	0	-15	-24

$$MR = \Delta R/\Delta Q$$

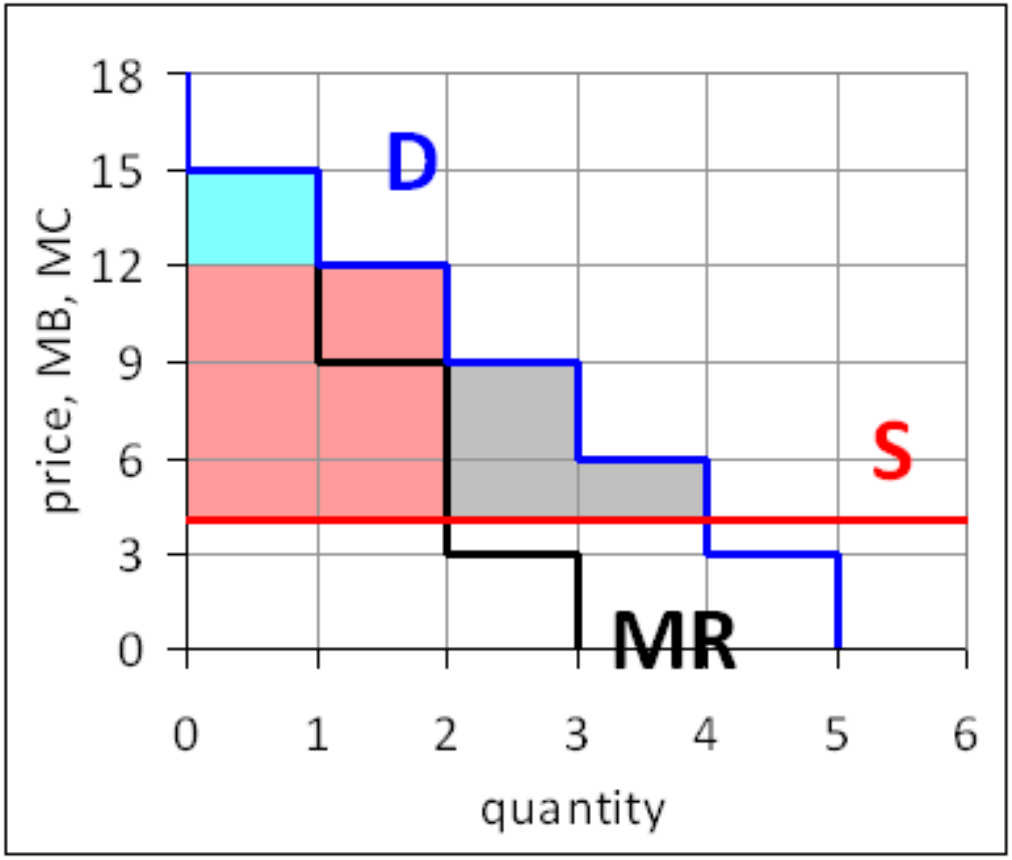
If a seller faces a downward-sloping demand curve, and he has to charge the same price for every unit, then when he increases production by one unit, his revenue increases from that sale, but it also decreases somewhat because all of the other units need to be sold at a lower price. MR takes this into account.

MONOPOLY, DISCRETE: GRAPH



If the firm acted as a price taker, as in a competitive market, then in equilibrium we have Q = 4, P = 4…
But if the firm acts as a monopolist, the equilibrium is Q = 2, *P = 12*. Although the marginal cost of the 2nd unit is only 4, and the MR is only 9, the monopolist can get as much as 12 per unit at Q = 2, so that's what he'll do.

MONOPOLY, DISCRETE: DEADWEIGHT LOSS



When the firm acts as a monopolist, the equilibrium is Q = 2, *P = 12*. Notice that consumer surplus has decreased from 26 to only 3! Meanwhile, the firm gets a profit or producer surplus of 2(12-4) = 16. The remaining 7 from the original consumer surplus—the grey area—is a deadweight loss from monopolization.

QUESTION 2 (quantity given perfect competition)

Q	MB
1	100
2	90
3	80
4	70
5	60
6	50
7	40

Suppose that consumers' marginal benefit is as given in the table. If there are many sellers who behave *competitively*, and each has a constant marginal cost of 55, then what is the quantity bought and sold in the market equilibrium?

A) 3 B) 4 C) 5 D) 6 E) 7

answer to question 2

Q	MB	MC
1	100	55
2	90	55
3	80	55
4	70	55
5	60	55
6	50	55
7	40	55

A) 3 B) 4 **C) 5** D) 6 E) 7

QUESTION 3 (price given perfect competition)

Q	MB	MC
1	100	55
2	90	55
3	80	55
4	70	55
5	60	55
6	50	55
7	40	55

Suppose that consumers' marginal benefit is as given in the table. If there are many sellers who behave *competitively*, and each has a constant marginal cost of 55, then what will the *price* be in the market equilibrium?

A) 60 **B) 55** **C) 50** **D) 45** **E) 40**

answer to question 3

Q	MB	MC
1	100	55
2	90	55
3	80	55
4	70	55
5	60	55
6	50	55
7	40	55

Given a perfectly competitive market where all sellers have a constant marginal cost of 55, then any sellers offering any price substantially greater than 55 will be undercut, and sell zero units.

A) 60 **B) 55** C) 50 D) 45 E) 40

QUESTION 4 (quantity given monopoly)

Q	MB
1	100
2	90
3	80
4	70
5	60
6	50
7	40

Suppose that consumers' marginal benefit is as given in the table. If there is only one seller, if the seller is behaving strategically, as a monopolist, and if the seller has a constant marginal cost of 55, then how many units will the seller sell, to maximize his profit?

A) 2 B) 3 C) 4 D) 5 E) 6

answer to question 4

Q	max price	TR = P×Q	MR	MC	TC	Π = TR–TC
1	100	100	100	55	55	45
2	90	180	80	55	110	70
3	80	240	60	55	165	75
4	70	280	40	55	220	60
5	60	300	20	55	275	25
6	50	300	0	55	330	-30
7	40	280	-20	55	385	-105

A) 2 **B) 3** C) 4 D) 5 E) 6

QUESTION 5 (price given monopoly)

Q	max price	R = P×Q	MR	MC	TC	Π = TR–TC
1	100	100	100	55	55	45
2	90	180	80	55	110	70
3	80	240	60	55	165	75
4	70	280	40	55	220	60
5	60	300	20	55	275	25
6	50	300	0	55	330	-30
7	40	280	-20	55	385	-105

Given the information above, what price does the monopolist charge, when he is maximizing profit?

A) 80 B) 240 C) 60 D) 55 E) 165

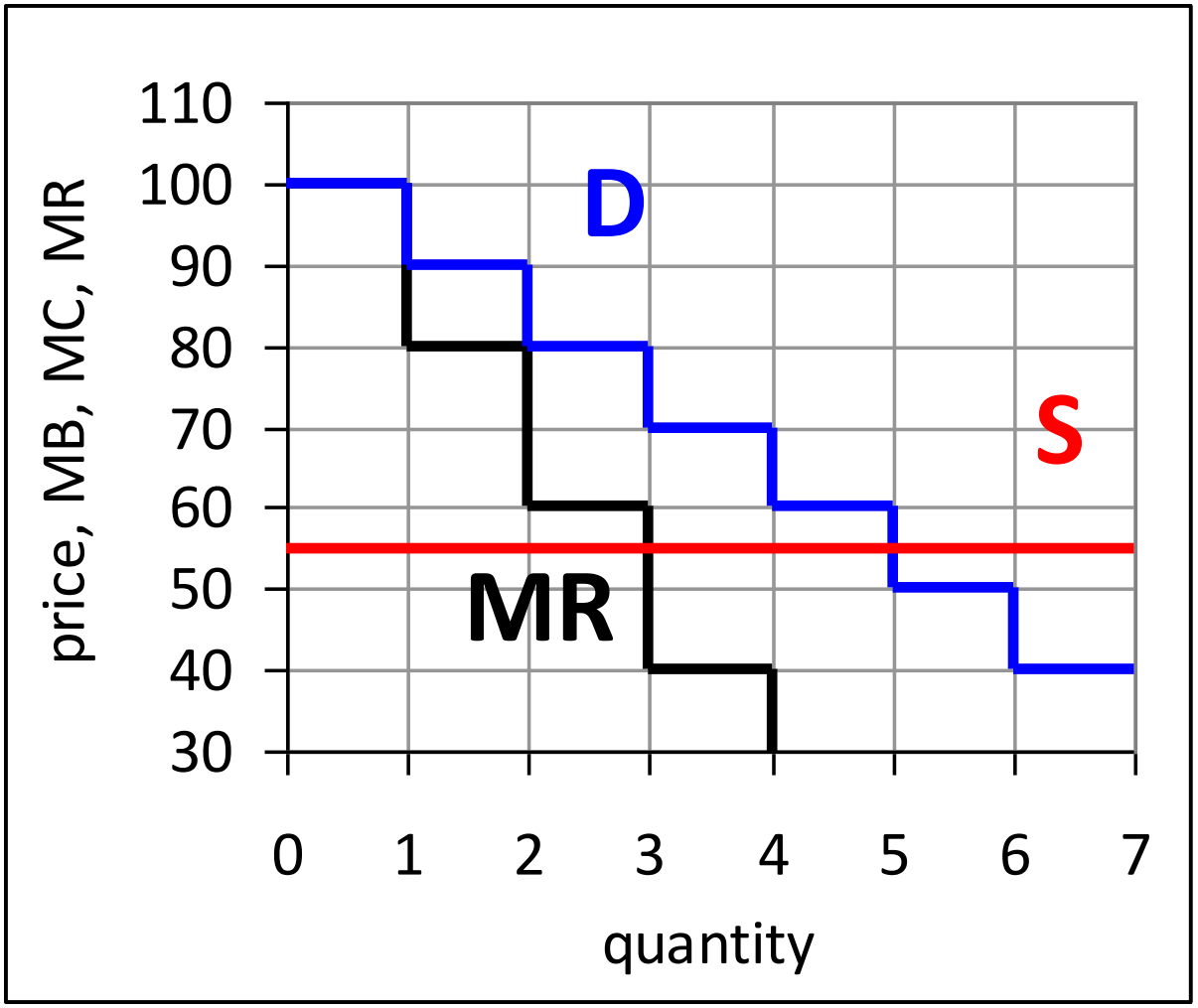
answer to question 5

Q	max price	R = P×Q	MR	MC	TC	Π = R–TC
1	100	100	100	55	55	45
2	90	180	80	55	110	70
3	80	240	60	55	165	75
4	70	280	40	55	220	60
5	60	300	20	55	275	25
6	50	300	0	55	330	-30
7	40	280	-20	55	385	-105

Given the information above, what price does the monopolist charge, when he is maximizing profit?

A) 80 B) 240 C) 60 D) 55 E) 165

GRAPH FOR QUESTIONS 2-5



Perfect competition: Q = 5, P = 55

Monopoly: Q = 3, P = 80

QUESTION 6 (perfect competition, continuous)

Suppose that consumers' marginal benefit is given by the equation MB = 20 – 2Q. If there are many sellers who behave *competitively*, and each has a constant marginal cost of MC = 4, then what is the quantity bought and sold in the market equilibrium?

A) 4 **B) 10** **C) 16** **D) 8** **E) 20**

answer to question 6

MB = 20 – 2Q

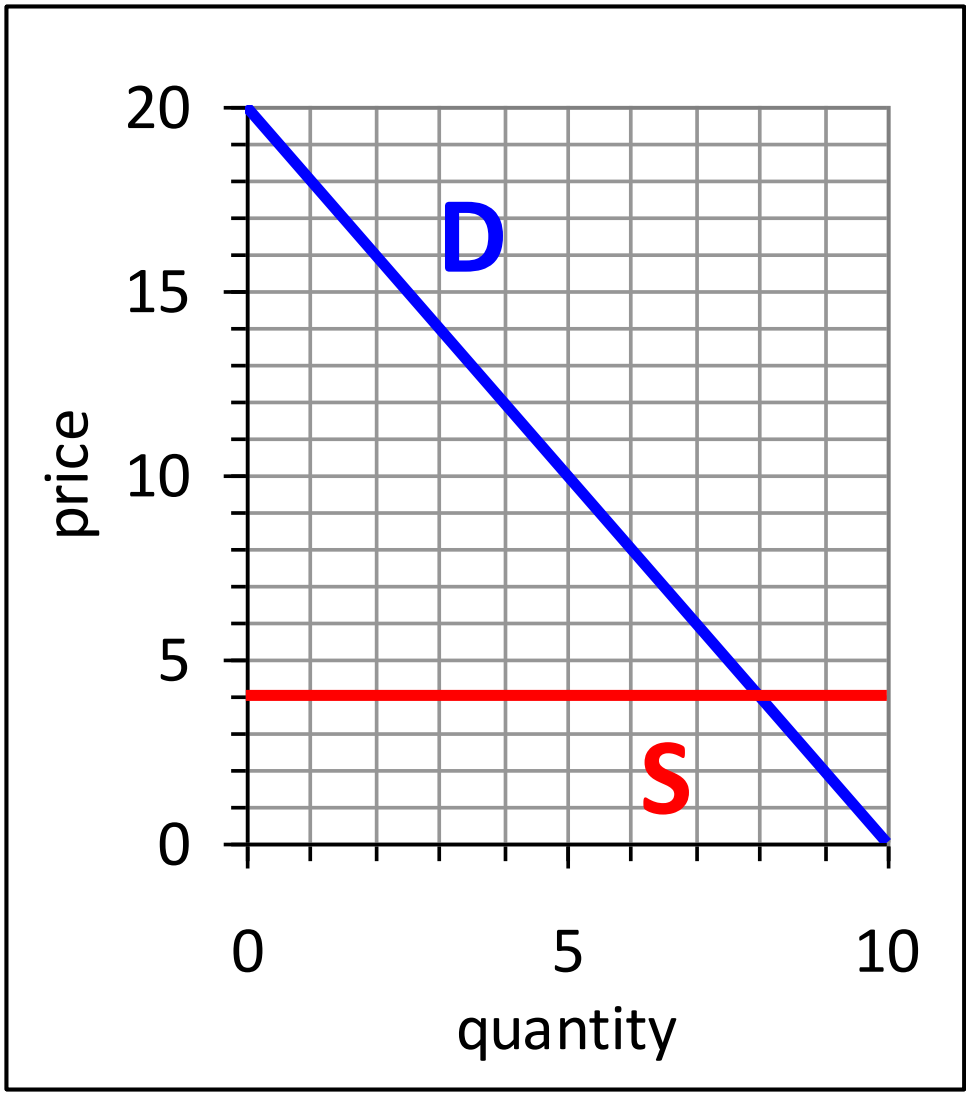
MC = 4

20 – 2Q = 4

2Q = 16

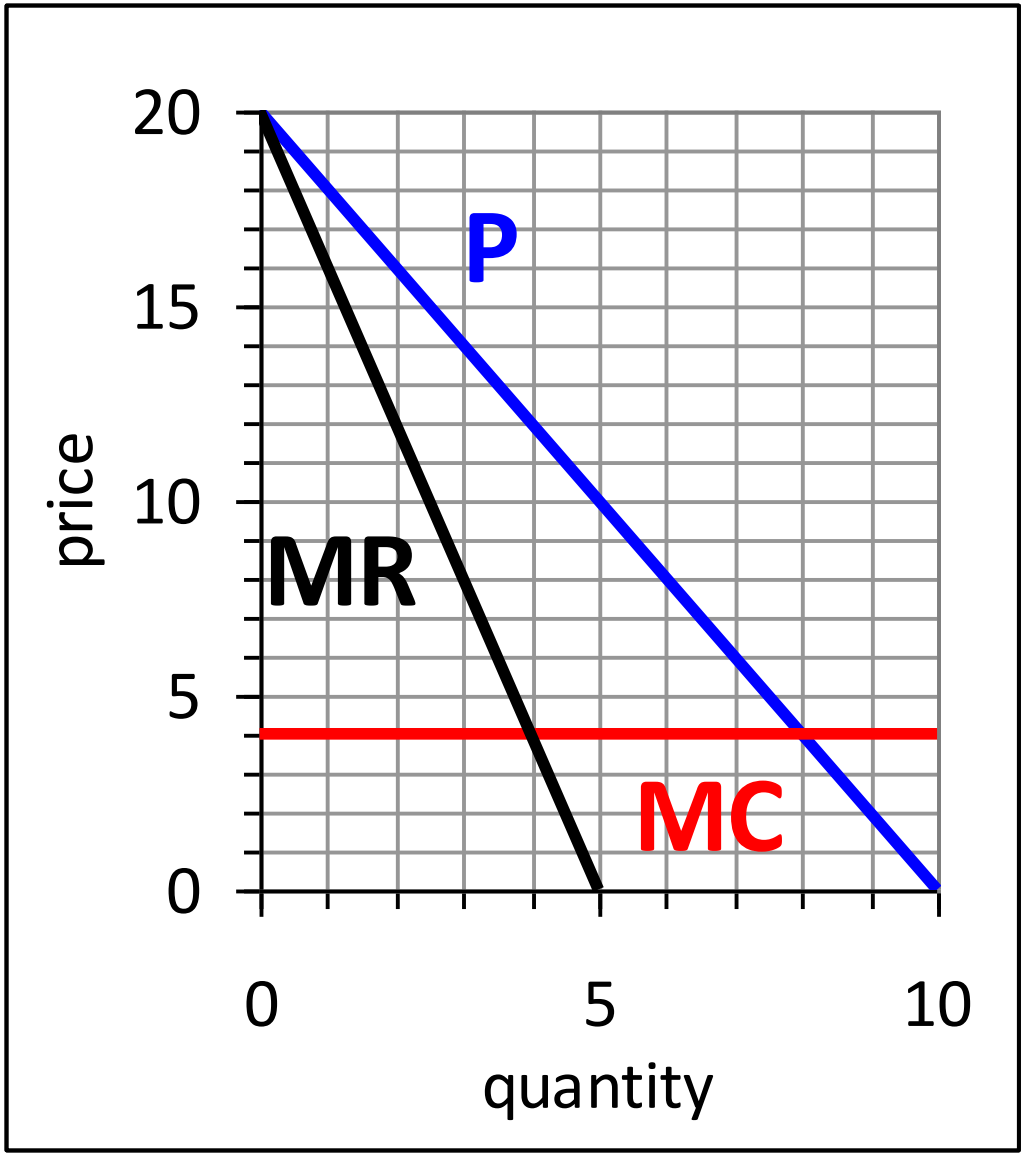
Q = 8

P = 4



A) 4 B) 10 C) 16 **D) 8** E) 20

MARGINAL REVENUE, CONTINUOUS



$P = 20 - 2Q$

$MC = 4$

$MR = 20 - 4Q$

In general, when the inverse demand curve is linear, with form $P = a - bQ$, then $MR = a - 2bQ$

MARGINAL REVENUE: CALCULUS*

$$R(Q) = P(Q)Q$$

$$\frac{dR}{dQ} = \underbrace{\frac{dP}{dQ}}_{= 0 \text{ in perfect competition}} Q + P$$

$$P(Q) = a - bQ$$

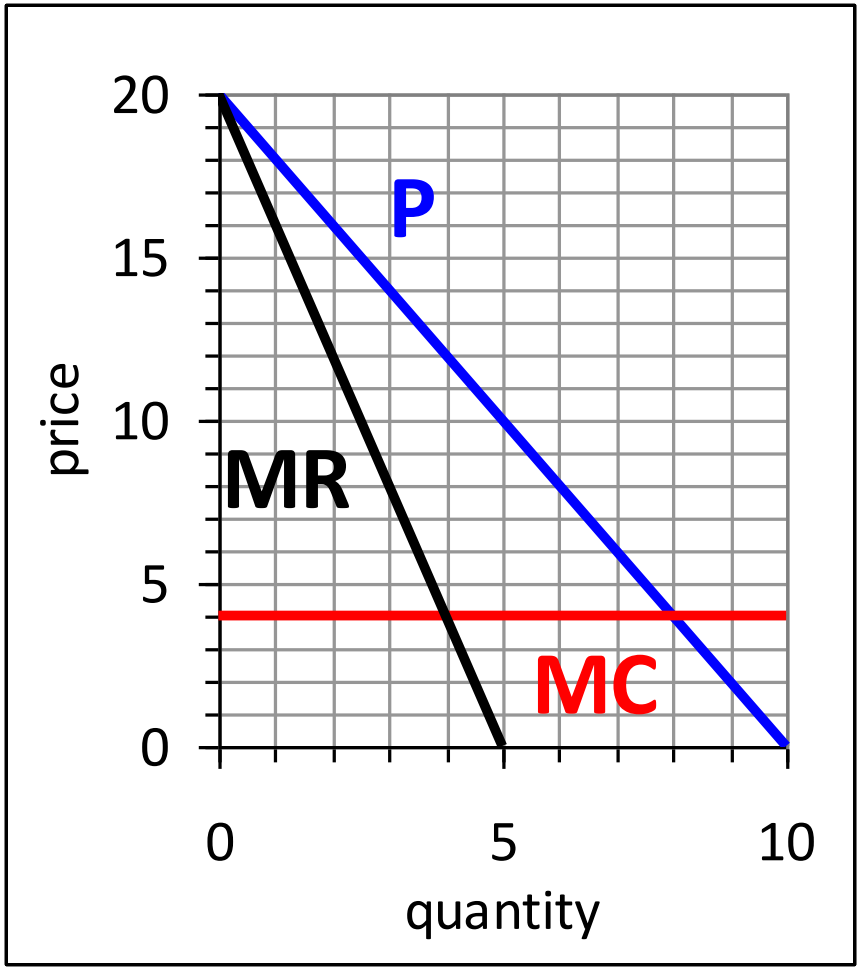
$$R = PQ = (a - bQ)Q$$

$$R = aQ - bQ^2$$

$$MR = \frac{dR}{dQ} = a - 2bQ$$

* you won't be asked to do any calculus on any tests

QUESTION 7 (quantity given monopoly, continuous)



P = MB = 20 – 2Q

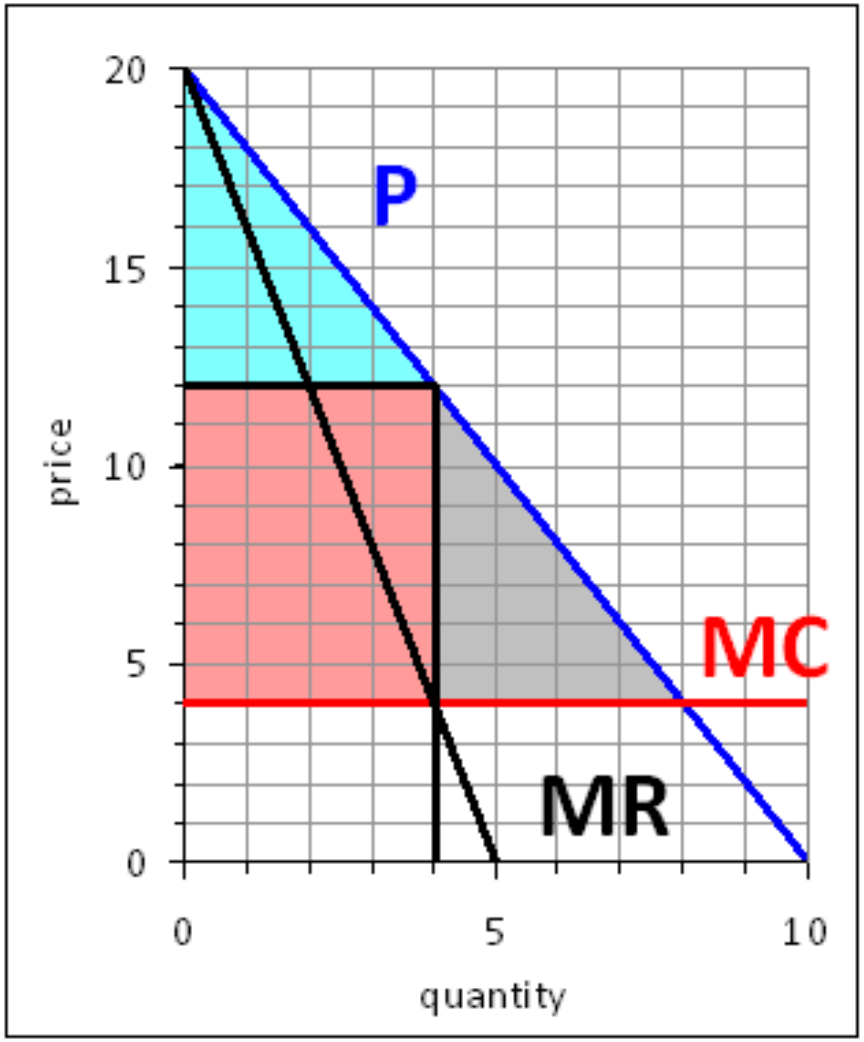
MC = 4

MR = 20 – 4Q

What quantity will this monopolist choose to sell?

A) 6 **B) 5** **C) 4** **D) 10** **E) 8**

answer to question 7



$P = MB = 20 - 2Q$

$MC = 4$

$MR = 20 - 4Q$

$MR = MC$

$20 - 4Q = 4$

$4Q = 16$

$Q = 4$

A) 6 B) 5 **C) 4** D) 10 E) 8

QUESTION 8 (quantity given monopoly, continuous)

$P = MB = 110 - 5Q$

$MC = 10 + 10Q$

$MR = 110 - 10Q$

What quantity will this monopolist choose to sell?

A) 6 B) 5 C) 4 D) 10 E) 8

answer to question 8

$P = MB = 110 - 5Q$

$MC = 10 + 10Q$

$MR = 110 - 10Q$

$MR = MC$

$110 - 10Q = 10 + 10Q$

$20Q = 100$

$Q = 5$

A) 6 **B) 5** C) 4 D) 10 E) 8

QUESTION 9 (price given monopoly, continuous)

$P = MB = 110 - 5Q$

$MC = 10 + 10Q$

$MR = 110 - 10Q$

$Q = 5$

What *price* will the monopolist choose?

A) 75 B) 11 C) 60 D) 22 E) 85

answer to question 9

P = MB = 110 – 5Q

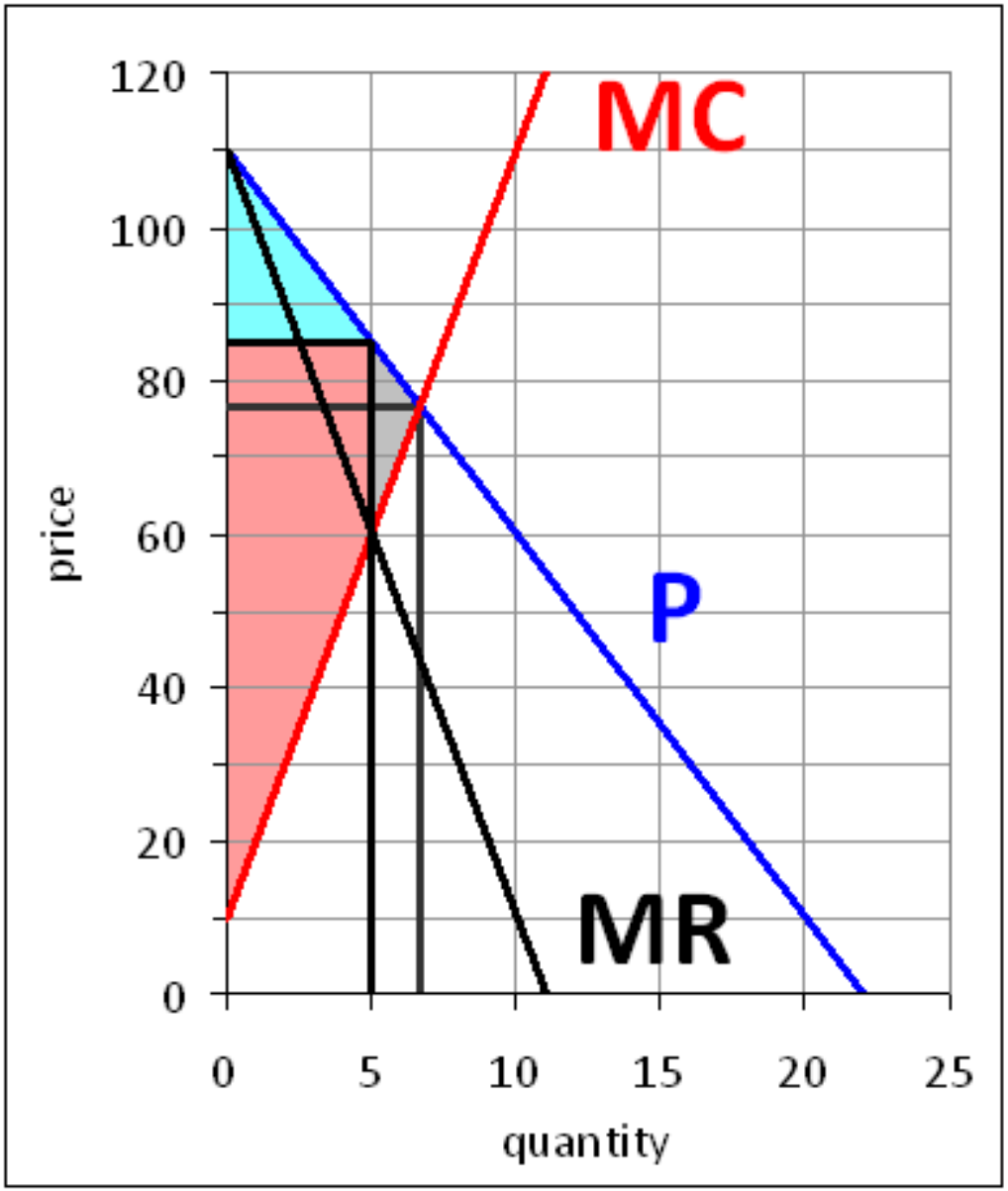
MC = 10 + 10Q

MR = 110 – 10Q

Q = 5

P = 110 – 5(5)

P = 85



SOURCES OF MARKET POWER

1. Exclusive control over important inputs
2. Patents and copyrights
3. Government licenses or franchises
4. Economies of scale
5. Network economies

ECONOMIES OF SCALE

Economies of scale: The average cost of production continues to decline as the quantity of production increases.

Natural monopoly: A monopoly that exists because of economies of scale. (That is, having only one firm actually minimizes the total industry-wide cost of production.)

For example, suppose that firms in some industry have a cost function of the form $TC = mQ + F$. Then, average total cost will be $ATC = m + F/Q$, which will continue to get smaller indefinitely as the quantity produced increases.

ECONOMIES OF SCALE

TC = mQ + F

ATC = m + F/Q