Microeconomics and mathematics (with answers)

1   Markets, demand and supply

Remarks:
- Abbreviations: Q = Quantity / P = Price / Q_d = Demand / Q_S = Supply
- Q_d, Q_S, P > 0
- Questions 5 and 6: You have to be familiar with quadratic equations. You can solve them either by factorization (if possible) or by using the formula.

1.1	Q_d = 60 - 3P Q_S = - 40 + 5P

1.11   Calculate the quantity demanded if the price is
- 6
- 2.5

1.12   Calculate the quantity supplied if the price is
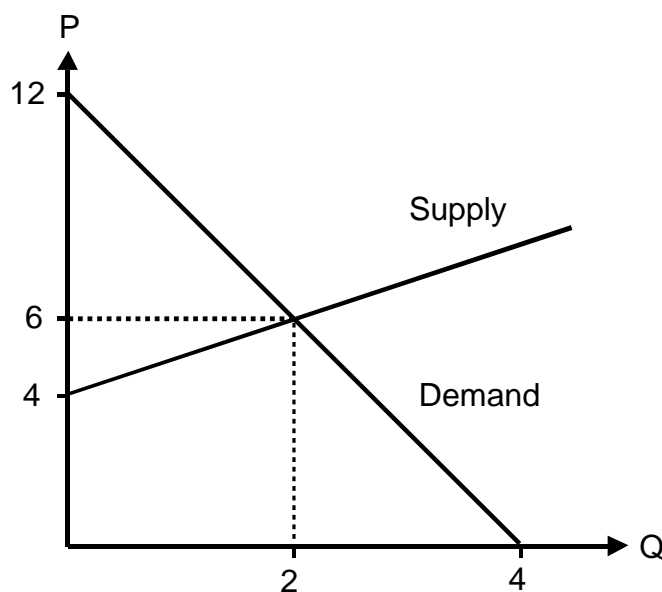- 12
- 16.4

1.13   Calculate the market equilibrium (P and Q).

1.14   Rearrange the demand and supply function to obtain inverse functions: (P = ...)

1.15   Graph this market (x-axis: Q / y-axis: P).

1.2	Which are the demand and the supply function (P = ...) for the following market?

1.3	P = 4 + 0.5*Q_S

1.31   Graph supply.

1.32   When graphing supply, which role do the values of 4 and 0.5 play?

1.4	Demand and supply on a market:

Price	Demand	Supply
120	0	80
110	5	70
100	10	60
90	15	50
80	20	40
70	25	30
60	30	20
50	35	10
40	40	0

1.41   Graph this market.

1.42   Find the demand and the supply function (P = ...).

1.43   Calculate the market equilibrium (P, Q).

1.5	$Q_d = 8 - P$ $Q_s = -4 + P^2$ 1.51 Calculate the market equilibrium. 1.52 Sketch this market.
1.6	$Q_d = 8 - 3P$ $Q_s = -2 + P^2$ Calculate the market equilibrium.

→   Answers. Click here!

Answers *Microeconomics* and mathematics

1 Markets, demand and supply
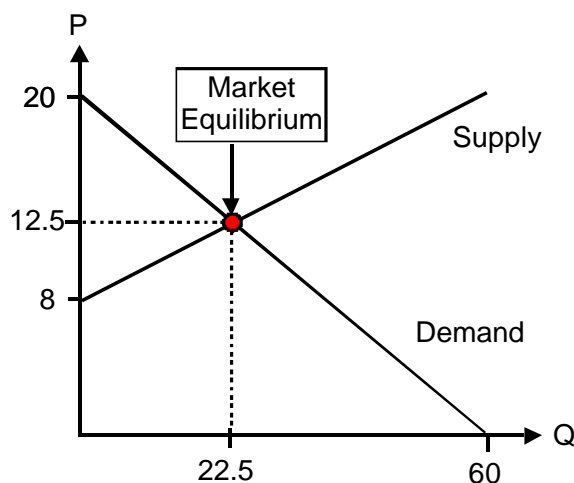
1.1

1.11 Price 6, quantity demanded: $60 - 3*6 = \mathbf{42}$
Price 2.5, quantity demanded: $60 - 3*2.5 = \mathbf{52.5}$

1.12 Price 12, quantity supplied: $-40 + 60 = \mathbf{20}$
Price 16.4, quantity supplied: $-40 + 5*16.4 = \mathbf{42}$

1.13 Market equilibrium if $Q_d = Q_s$
$60 - 3P = -40 + 5P$
$-8P = -100$
P = 12.5
$\mathbf{Q} = Q_d (= Q_s) = 60 - 3*12.5 = \mathbf{22.5}$

1.14
$Q_d = 60 - 3P$	$Q_s = -40 + 5P$
$3P = 60 - Q_d$	$-5P = -40 - Q_s$
$\mathbf{P = 20 - Q_d/3}$	$5P = 40 + Q_s$
	$\mathbf{P = 8 + Q_s/5}$

1.15

1.2

Demand: $P = 12 - 3Q_d$
Supply: $P = 4 + Q_s$

1.3

1.31 Supply: $P = 4 + 0.5*Q$
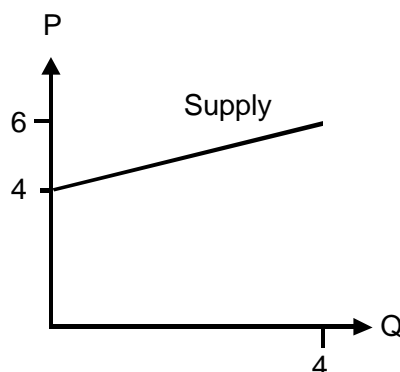
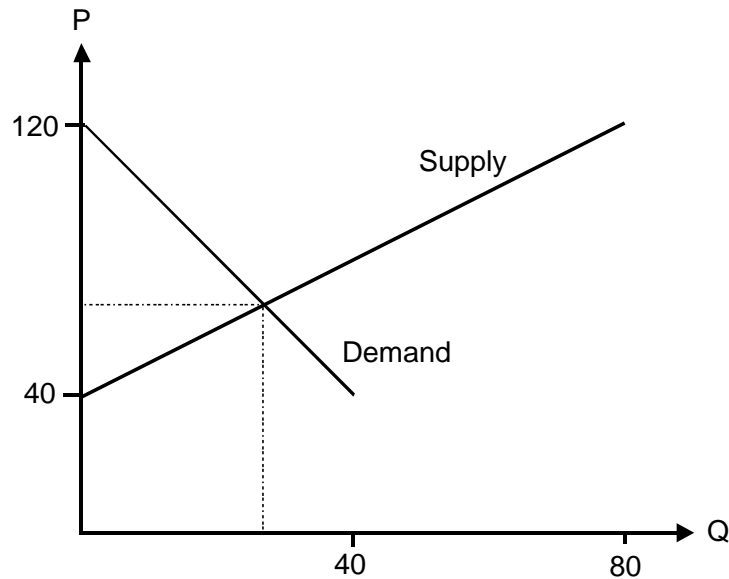|		
1.3 **cont.**	1.32	4 = y-intercept (y if x = 0) 0.5 = slope of the supply curve
1.4	1.41	Graph of the market: 1.42 Demand: P = 120 - 2Q$_d$ Supply: P = 40 + Q$_S$ 1.43 Market equilibrium if P$_d$ = P$_S$ and Q$_d$ = Q$_S$ 120 - 2Q = 40 + Q - 3Q = - 80 **Q** = 80/3 = **26$\frac{2}{3}$** **P** = 120 - 2Q = 120 - 2*26$\frac{2}{3}$ = **66$\frac{2}{3}$**
1.5	1.51	Market equilibrium: • by factorization: Q$_d$ = Q$_S$ 8 - P = - 4 + P^2 - P^2 - P + 12 = 0 - (P^2 + P - 12) = 0 - (P + 4)(P - 3) = 0 [P$_1$ = - 4] [no solution because P < 0] **P$_2$ = 3** [because if P = 3 → (3 - 3) = 0] Q$_d$ = 8 - P = 8 - 3 = 5 → **Q = 5** • by formula: P$_1$,P$_2$ = $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ = $\dfrac{1 \pm \sqrt{1^2 + 48}}{-2}$ [P$_1$ = $\dfrac{1 + \sqrt{1^2 + 48}}{-2}$ = - 4] **P$_2$** = $\dfrac{1 - \sqrt{1^2 + 48}}{-2}$ = **3** **Q** = 8 - P = 8 - 3 **= 5**

1.5	1.52 Sketch of the market:
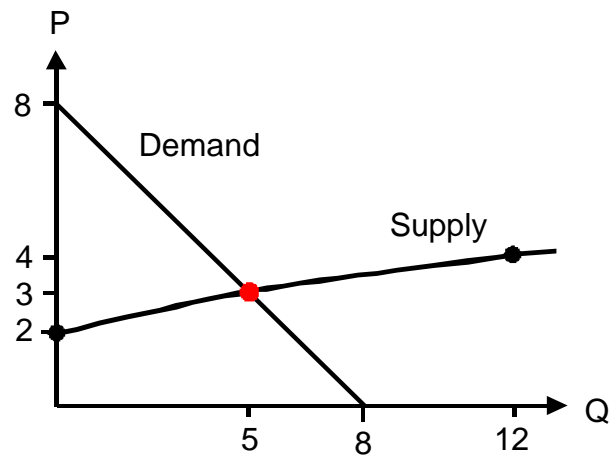
1.6   Market equilibrium:

- by factorization:

$Q_d = Q_s$

$8 - 3P = -2 + P^2$

$-P^2 - 3P + 10 = 0$

$-(P^2 + 3P - 10) = 0$

$-(P + 5)(P - 2) = 0$

$[P_1 = -5]$ [no solution because P < 0]

$P_2 = 2$ [because if P = 2 → (2 - 2) = 0]

$Q_d = 8 - 3P = 8 - 6 = 2$ → **Q = 2**

- by formula:

$$P_1, P_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{3 \pm \sqrt{3^2 + 40}}{-2}$$

$$\left[P_1 = \frac{3 + \sqrt{3^2 + 40}}{-2} = -5 \right]$$

$$\mathbf{P_2} = \frac{3 - \sqrt{3^2 + 40}}{-2} = 2 \qquad \mathbf{Q = 2}$$

→ Back to questions. Click here!