Homework3

1

Note: everywhere here ϵ means elasticity of demand

a.

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{1.80 - 2.10}{20 - 10}$

$m = \frac{-0.30}{10}$

$m = -0.03$

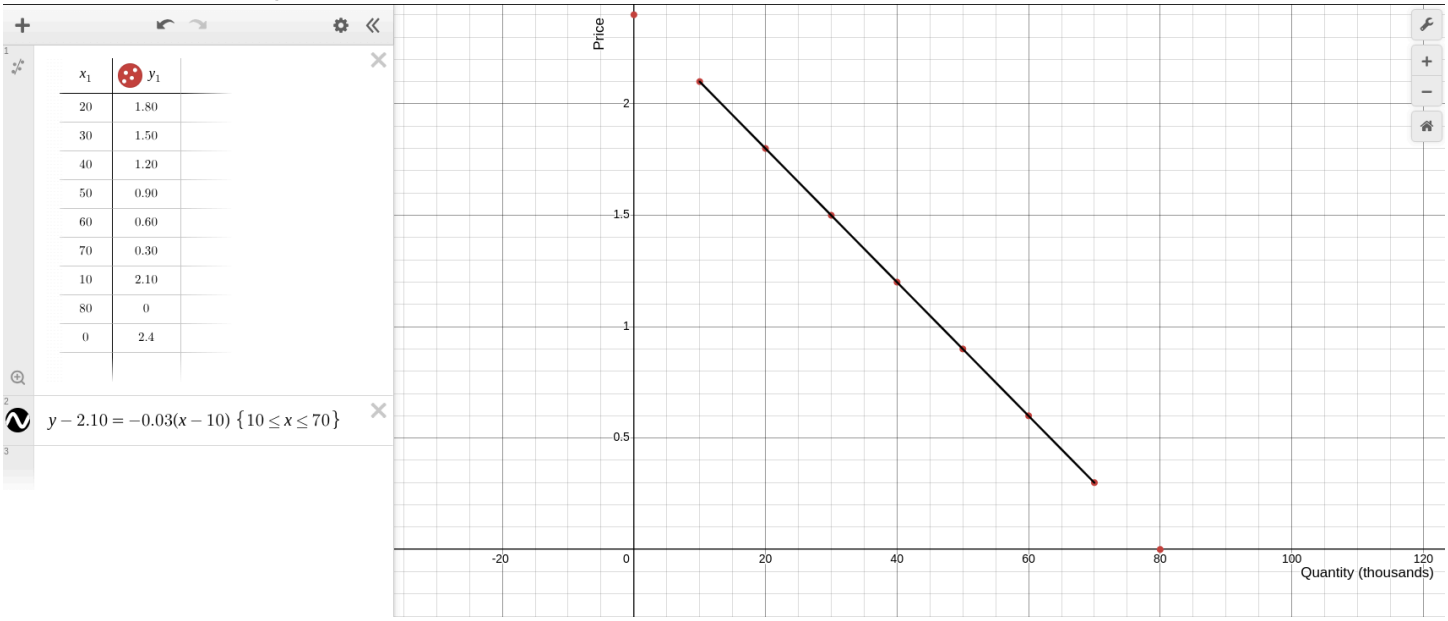
$y - 2.10 = -0.03(x - 10)$

$y = -0.03x + 0.30 + 2.10$

$y = -0.03x + 2.40$

$Q(P) = -0.03P + 2.40$

Not written in the plot but Price is in £.



x_1	y_1
20	1.80
30	1.50
40	1.20
50	0.90
60	0.60
70	0.30
10	2.10
80	0
0	2.4

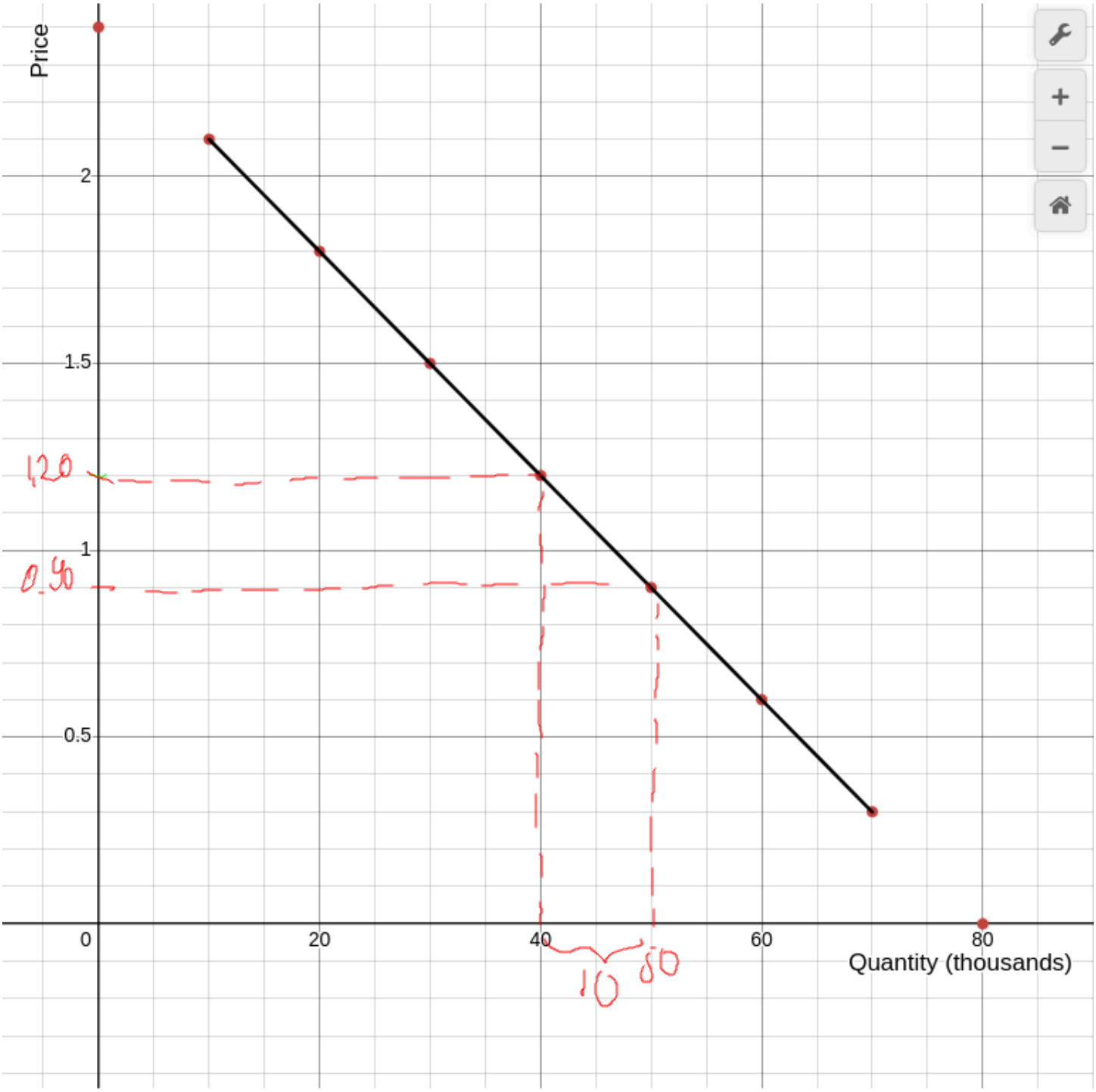
$y - 2.10 = -0.03(x - 10)\ \{10 \le x \le 70\}$

b.

£1.20 - £0.30 = £0.90

50,000 - 40,000 = 10,000

Not written in the plot but Price is in £.



c.

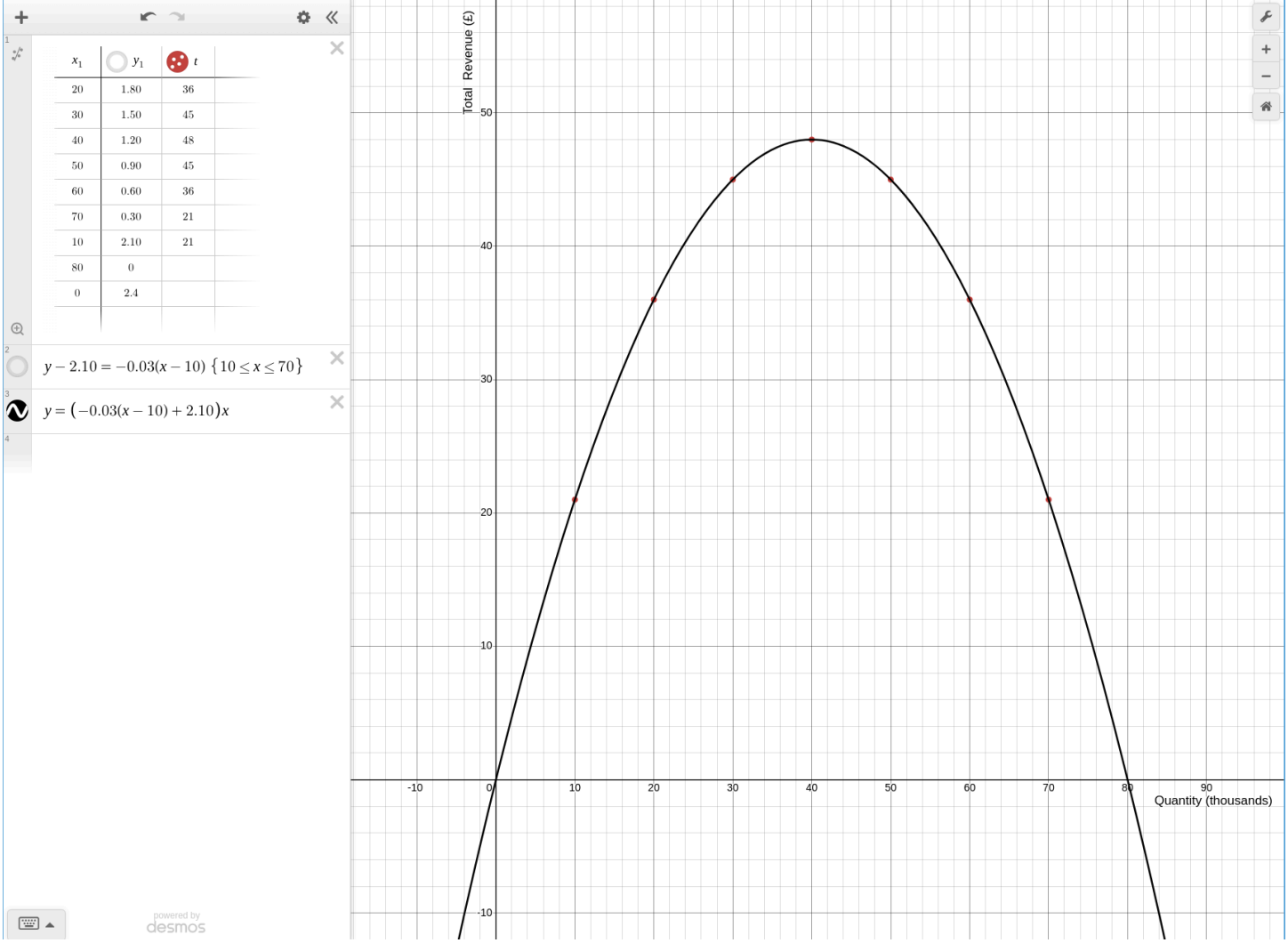
Total Spending (£ Thousands) = Quantity (Thousands)* Price (£)

Price (£)	Quantity (Thousands)	Total Spending (£ Thousands)
2.10	10	21
1.80	20	36
1.50	30	45
1.20	40	48
0.90	50	45
0.60	60	36
0.30	70	21

d.
$\epsilon = \frac{\Delta q\%}{\Delta p\%} = \frac{(\Delta q/q)}{(\Delta p/p)} = \frac{\Delta q}{\Delta p}\frac{p}{q} = m^{-1}\frac{p}{q}$
or
$\epsilon == \frac{\delta q}{\delta p}\frac{p}{q} = m^{-1}\frac{p}{q}$

Price (£)	Quantity (Thousands)	Total Spending (£ Thousands)	Own Price Elasticity of Demand
2.10	10	21	-7
1.80	20	36	-3
1.50	30	45	-1.67
1.20	40	48	-1
0.90	50	45	-0.6
0.60	60	36	-0.33
0.30	70	21	-0.14

e.
$TotalRevenue = Q(P) * P = (-0.03P + 2.40)P$
Degree of polynomial is 2 so we get a quadratic curve.



f.

From the grapth and table above you can see that the peek is at 48.

or

$dy/dx = d(-0.03x^2 + 2.40x)/dx$

$dy/dx = -0.03 * 2x + 2.40$

$dy/dx = -0.06x + 2.40$

$-0.06x + 2.40 = 0$

$-0.06x = -2.40$

$x = -2.40/-0.06$

$x = 40 \Longrightarrow y = 48$

So for price 1.2£ revue was the highest. You can read from table also.

g.

1.2£ (you can't gain more revenue then this $\Longrightarrow$ -1 elasticity)

b.

$|\epsilon| > 1$ elastic $\Longrightarrow$ P = [2.1, 1.8, 1.5] £ or $1.2 < p <= 2.1$

$|\epsilon| = 1$ unit-elastic $\Longrightarrow$ P = [1.2] £

$|\epsilon| < 1$ inelastic $\Longrightarrow$ P = [0.9, 0.6, 0.3] £ or $0.3 <= p < 1.2$

3

a. b. c. d.

$\epsilon_i = \frac{\Delta Q\%}{\Delta I\%}$ I- for income
Assuming the prices are constant $\Longrightarrow$
$\epsilon_i = \frac{\Delta E\%}{\Delta I\%}$ E- for expenditure
Proof:

$$E = Q \cdot P \implies \frac{E}{P} = Q \implies \Delta Q\% = \frac{\Delta Q}{Q} \overset{P \text{ is constant}}{=} \frac{1}{P}\frac{(E_1 - E_2)}{(E/P)} = \frac{\Delta E}{E} = \Delta E\%$$

Good	Income (Year 1)	Income (Year 2)	Budget Share (Year 1)	Budget Share (Year 2)	Income Elasticity (E_i)	Normal/Inferior	Luxury/Necess
GoodA	£30	£50	0.30	0.25	0.67	Normal	Necessity
GoodB	£30	£70	0.30	0.35	1.33	Normal	Luxury
GoodC	£25	£20	0.25	0.10	-0.2	Inferior	Neither
GoodD	£15	£60	0.15	0.30	3.0	Normal	Luxury

Good	Income elasticity	Quantity demanded	Budget share	Example
Normal	Positive	Rises		
Luxury	Above 1	Rises more than 1%	Rises	BMW
Necessity	Between 0 and 1	Rises less than 1%	Falls	Food
Inferior	Negative	Falls	Falls	Bread