Exam Answers

February 20, 2014

Question 1

a

$$\begin{aligned}
Q_d =& 800 - 7p \\
Q_d =& 800 - 7 \times 10 \\
Q_d =& 800 - 70 \\
Q_d =& 730
\end{aligned}$$

b

At the equilibrium $Q_d = Q_s$, therefore

$$\begin{aligned}
Q_d = 800 - 7p =& 50 + 8p = Q_s \\
800 - 7p =& 50 + 8p \\
800 - 50 =& 8p + 7p \\
750 =& 15p \\
\frac{750}{15} =& p \\
50 =& p
\end{aligned}$$

When p = 50,

$$\begin{aligned}
Q_d =& 800 - 7 \times 50 \\
Q_d =& 800 - 350 \\
Q_d =& 450
\end{aligned}$$

c

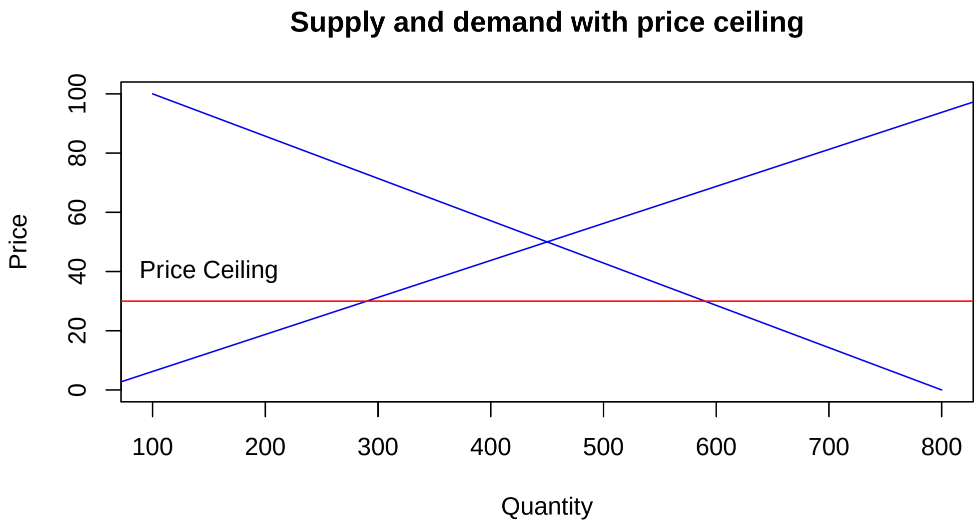
We know that the equilibrium price is above the price ceiling of 40. The quantity demanded

$$
\begin{aligned}
Q_d =& 800 - 7 \times 40 \\
Q_d =& 800 - 280 \\
Q_d =& 530
\end{aligned}
$$

The quantity supplied

$$
\begin{aligned}
Q_s =& 50 + 8 \times 40 \\
Q_s =& 50 + 320 \\
Q_s =& 370
\end{aligned}
$$

Demand is greater than supply. There will be an attempt to break the ceiling.



d

Now

$$
\begin{aligned}
Q_d = Q_s = 500 - 7p =& 50 + 8p \\
500 - 50 =& 15p \\
\frac{450}{15} =& p \\
30 =& p
\end{aligned}
$$

and

$$
\begin{aligned}
Q_d =& 500 - 7 \times 30 \\
Q_d =& 500 - 210 \\
Q_d =& 290
\end{aligned}
$$

1 Question 2

a

For the standard percentage change method of elasticity.

$$
\begin{aligned}
P_{ed} =& \frac{\%\Delta Q}{\%\Delta P} \\
=& \frac{(6000 - 10000)/10000}{(12 - 8)/8} \\
=& \frac{-0.4}{0.5} \\
=& -0.8
\end{aligned}
$$

For the mid-point method of elasticity

$$
\begin{aligned}
P_{ed} =& \frac{\Delta Q/\text{mid-point}Q}{\Delta P/\text{midpointP}} \\
=& \frac{(6000 - 10000)/8000}{(12 - 8)/10} \\
=& \frac{-4000/8000}{4/10} \\
=& \frac{-0.5}{0.4} \\
=& -1.25
\end{aligned}
$$

The advantage of the mid-point method is that it does not change when moving up or down the curve.

b

The point elasticity of demand is taken from

$$
P_{ed} = \frac{\Delta Q/Q}{\Delta P/P}
$$

Re-arrange

$$P_{ed} = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

Therefore, for this question. Where $P = 28$,

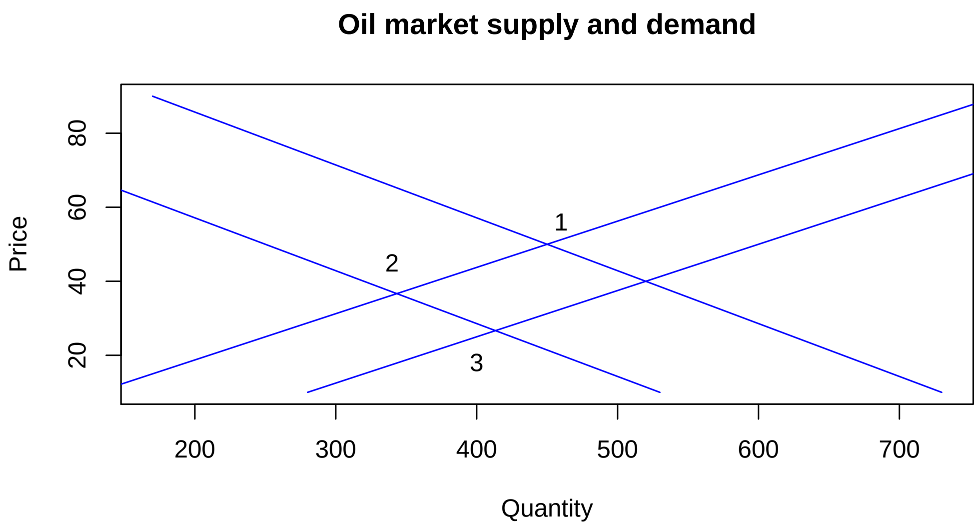
$$\begin{aligned} Q_d =& 546 - 7 \times p \\ =& 546 - 7 \times 28 \\ =& 546 - 196 \\ =& 350 \end{aligned}$$

From the equation for a straight line, $\frac{\Delta Q}{\Delta P}$ is equal to 7. Therefore,

$$\begin{aligned} P_{ed} =& \frac{28}{350} \times 7 \\ =& 0.08 \times 7 \\ =& 0.56 \end{aligned}$$

c

One of the factors that can shift the supply or demand curves is price expectation. Therefore, from equilibrium 1, the expectation of price decline leads to a left-ward shift of the demand curve for equilibrium 2 and a right-ward shift of the supply curve to 3. This is de-stabilising speculation.



Question 3

a

The budget can be used to purchase $\frac{400}{20} = 20$ units of product X or $\frac{400}{16} = 25$ units of product Y. Therefore, the budget line runs from 20 on the x axis for product X to 25 on the y axis for product Y, forming a tangent to IC_4. The point of tangency must be marked to show the optimum combination of x and y that can be purchased with this budget.

b

The slope of the budget line is $\frac{25}{20} = 1.25$ at the original prices. When the price of good x rises to 40, it is possible to purchase $\frac{400}{40} = 10$ units and the ratio of prices and the slope of the budget line shifts to $\frac{25/10}{=}2.5$.

c

The budget line will now run from 10 on the x axis to 25 on the y axis and will form a tangent to IC_2. The point needs to be shown to get the marks.

d

Point Z is feasible but it is not optimal. Utility can be increased by moving from IC_1 to IC_2. The curve IC_5 cannot be achieved with the current budget. It would require increased income to push the budget line to the right or a reduction in prices to achieve this level of utility.

Question 4

a

If total utility is

$$TU = 5X - 4X^2$$

Marginal Utility is the derivative

$$\frac{dU}{dX} = 5 - 8X$$

There is diminishing marginal utility because as X increases marginal utility falls.

b

Given $TPP = 120Q + 27Q^2 - Q^3$, the maximum will be when the marginal is zero. Therefore,

$$\begin{aligned}\frac{dTPP}{dQ} = 120 + 54Q - 3Q^2 =& 0\\ 3Q^2 - 54Q - 120 =& 0\\ (3Q - 60)(Q + 2) =& 0\end{aligned}$$

Therefore, either $3Q - 60 = 0$ or $Q + 2 = 0$. In the first case $Q = \frac{60}{3} = 20$, in the second $Q = -2$. The maximum must be 20.

c

Given $TR = 500Q - 5Q^2$, marginal revenue is the derivative.

$$\frac{dTR}{dQ} = 500 - 10Q$$

Given $TC = 20 + 20Q + Q^2$, marginal cost is the derivative

$$\frac{dTC}{dQ} = 20 + 2Q$$

Profit maximisation is when MR = MC, therefore

$$\begin{aligned}MR = 500 - 10Q =& MC = 20 + 2Q\\ 500 - 10Q =& 20 + 2Q\\ 500 - 20 =& 2Q + 10Q\\ 480 =& 12Q\\ \frac{480}{12} =& Q\\ 40 =& Q\end{aligned}$$

d

Total Profit (TP) equals TR - TC, therefore it is equal to

$$\begin{aligned}TP =& 500Q - 5Q^2 - 20 - 20Q - q^2\\ =& 480Q - 6Q^2 - 20\end{aligned}$$

At the maximum output of 40Q.

$$
\begin{aligned}
TP =& 480 \times 40 - 6 \times 40^2 - 20 \\
=& 19200 - 6 \times 1600 - 20 \\
=& 19200 - 9600 - 20 \\
=& 9600 - 20 \\
=& 9580
\end{aligned}
$$