SOLUTIONS

A very good idea is to start your answer with statements of the relevant definitions —
you'll get some marks, and it might steer you clear of pitfalls that can occur when you're
not quite clear in your own mind as you consider your answer.

1. *F.* Define price elasticity of demand; elastic and inelastic demand. If the crop
shrinks, then the supply curve shifts left. Price rises, moving up the downwards-
sloping industry demand curve. Inelastic demand means that rising price leads to
rising revenue, not falling. (Figure 1.)

2. *T.* Define price-taking (horizontal demand at the going price) and profit-
maximising ($y*$ such that $MC(y^*) = MR(y^*) = P(y^*)$, when a price taker). As
price rises, will $y*$, the optimal output also rise? Yes, if $MC(y^*)$ rises. And it
will, if π is being maximised, not minimised. Indeed, rising MC is necessary for
π-maximisation, as shown in all figures in the lectures. (See also the TR and TC
curves against output.) (Figures 2a and 2b.)

3. *F.* Define market power (a downwards-sloping demand curve, so that a
monopolist can price above MC to maximise π: the mark-up, and so does not set
$P(y^*) = MC(y^*)$), and the supply curve (the maximum amount at any price that a
π-maximising firm will offer for sale; or the minimum price at which a
π-maximising firm will supply a given amount of output at). The firm chooses
$y*$ so that $MR(y^*) = MC(y^*)$ and sets $P > MC(y^*)$, from the demand curve. A
firm exercising market power does not have a supply curve, since it is not a price-
taker. (Figure 3.)

4. *T.* We know that the demand curve is linear, but not the choke price $\bar{P}$. We also
know that the MR curve has the same price intercept (the choke price $\bar{P}$), but
twice the slope (–ve), so that the MR curve cuts the quantity axis at $y = 5$,
$MR(5) = 0$. The π-maximiser chooses $y*$ such that $MC(y^*) = MR(y^*)$. The
minimum MC is zero — it cannot be negative — so the maximum output possible
is 5 units (incidentally at the point of unitary elasticity on the linear demand
curve). (Figure 4.)

5. *T.* Define opportunity cost. If the sacrifice you make to enjoy more leisure time is
forgoing the income (at least) of working in paid employment — and this is
implicit in the question — then if the wage rate rises, the opportunity cost of
leisure (that is, the forgone income) must rise too.

6. *F.* Define average cost AC and marginal cost MC. AC rises if $MC > AC$,
because the high cost of making the additional unit is arithmetically pulling up the

AC of all units produced. And the opposite holds when *MC* < *AC*. Whether *MC* is rising or falling is irrelevant to the movement of *AC*. Consider the usual diagram. In the indicated region *MC* is rising but *AC* is falling (because *MC* < *AC*). The question's assertion is thus wrong as a general statement. (Figure 6.)

7. *F.* "If a government seeks to raise revenue" through sales taxes, then it's primarily interested in revenues, not the inefficiencies (or DWL) introduced by the tax. If it taxes goods and services with elastic demand, then quantity will fall disproportionately, whereas if it taxes goods and services with inelastic demand, quantity will fall only slightly, and tax revenues will be higher than the alternative. Think tobacco and alcohol: "beer and smokes".

8. *F.* Define price elastic and inelastic demand. "Above" means up the page, when we plot price on the vertical axis and quantity on the horizontal. Remember that inelastic demand means that a price increase results in increased revenue, whereas the opposite holds for elastic demand. Imagine $P = 0$ and large Q (revenue is zero); raising price in equal-price steps increases revenue (the area of the rectangle grows with its height) up to a point (the mid-point of the line), after which the area of the rectangle shrinks to zero at $Q = 0$. The lower half of the line was inelastic; the upper elastic. (Figure 8.)

9. *T.* Define fixed costs, average fixed costs, and the short run. In the short run *FC* are just that — fixed. *AFC* must fall, since $AFC = FC/y$, as y increases. You could plot the rectangular hyperbola of the *AFC*, if you wanted. (Figure 9.)

10. Define fixed costs, variable costs, total costs, short run and long run. Define the competitive firm's supply curve. *True* in the short run, since the supply curve is the firm's *MC* curve above *AVC*. But in the long run the firm's supply curve is the firm's *MC* above the *ATC* (which includes the *AVC* + *AFC*). Two firms with the same *VC* but different *FC* will have different supply curves: the firm with the higher *FC* will exit the industry at a higher *P* than will the firm with the lower *FC*. ∴ *False* in the long run, even without a change in *FC*. (Figure 10.)

11. Complete the table (no mistakes, mind!):

Output	Fixed Cost ($)	AFC ($/unit)	Variable Cost ($)	AVC ($/unit)	Total Cost ($)	ATC ($/unit)	MC ($/unit)
0	100	na	0	na	100	na	na
1	100	100	40	40	140	140	40
2	100	50	70	35	170	85	30
3	100	33.3	120	40	220	73.3	50

4	100	25	180	45	280	70	60
5	100	20	250	50	350	70	70
6	100	16.7	330	55	430	71.7	80

a. Define the short-run shut-down condition. The minimum AVC (from the table) is $35/unit at $y = 2$. If price fell below $35/unit, then shut down.

b. Define profit. Break-even ($\pi=0$) occurs at minimum AC, which is $70/unit, at quantity of 4 or 5. Generally choose the larger output, $y = 5$ units.

c. Define the price-taker's profit-maximising choice: $y*$ such that $P \geq MC(y*)$. At $P = \$76$, from the table occurs between 5 and 6 units of output, since $MR(5) = \$70$/unit, and $MR(6) = \$80$/unit. When $y = 5$, profit $= 76 \times 5 - 350 = \$30$; when $y = 6$, profit $= 76 \times 6 - 430 = \$26$; $\therefore$ choose $y = 5$.

(Or you could read quantities and prices from a plot: note that MC cuts AVC at its minimum, as well as ATC at its minimum, because $MC \equiv MVC$.) (Figure 11.)

12.

a. Define elastic and inelastic price elasticities. Since $\eta = 1.63 > 1$, then elastic demand. Explain the implication.

b. Define income elasticity of demand, inferior goods, normal goods. Since $\varepsilon = 1.40 > 0$, the a normal good, not an inferior good. Explain the implication.

c. Since the price elasticity is the ratio of the percentage change in quantity demanded, per 1% change in price (and $-ve$), then a fall in prices of 2% should result in an increase of $2 \times 1.63 = 3.26\%$ in the demand for restaurant meals.

d. Over what period? Recall that elasticities are time-dependent: in the shorter term demand is less elastic, in the longer term, more elastic. What is the time frame of the 1.63? Of the change in quantities? Other things are cet. par. etc.

e. Since the income elasticity of demand is the ratio of the percentage change in quantity demanded per 1% change in income (and $+ve$ or $-ve$), then a rise in incomes of 45% over the period would result in an increase in quantity of meals demanded of $45 \times 1.40 = 63\%$.

13. Young Robert focussed on the cost side of the process; he ignored the demand side. But we know that the lower the price elasticity of demand, the greater the increase in revenue from any price rise. We can deduce that, since their demand is more elastic ("No steenking haircut for me today!") boys are charged less. Men,

on the other hand, can afford to be better groomed and care about their appearance more, so are charged more, since their demand is less price elastic. There may be other attractions for men in relaxing in the barber's chair and talking about ... whatever.

14. Define the determinants of short-run and long-run supply and demand for houses, both new and second-hand. In particular, the number of houses offered for sale is a function of expected future prices, of interest rates, of average incomes, and average prices of houses, and for new houses there may be a lag in supply.

   a. If demand shifts outwards and the supply curve is unshifted, then moving up the supply curve prices will rise, and with any supply curve other than completely inelastic quantities will rise. Not what is reported. (Figure 14a.)

   b. With no change in demand, if supply contracted, then moving up the unshifting demand curve prices will rise and quantity fall, as reported, but not as described by the REI spokesperson. (Figure 14b.) Or demand could also expand, but not enough to offset the fall in supply. (Figure 14c.)
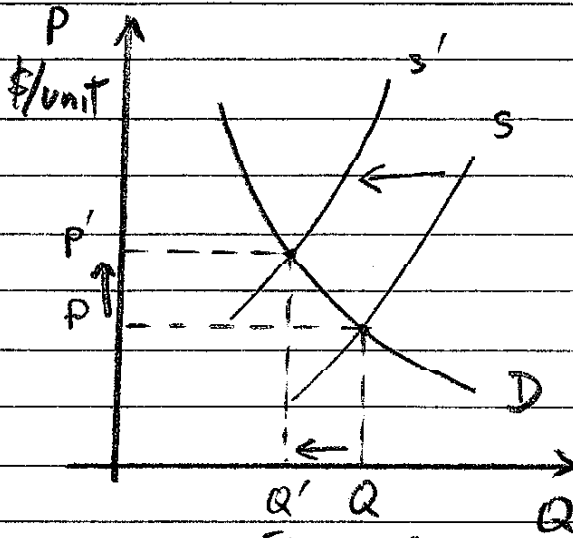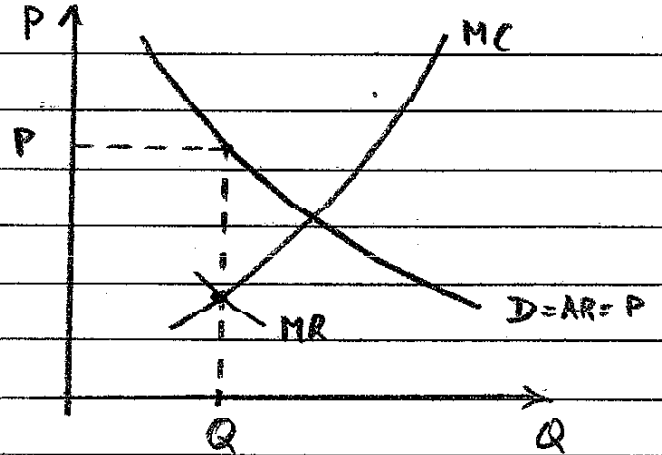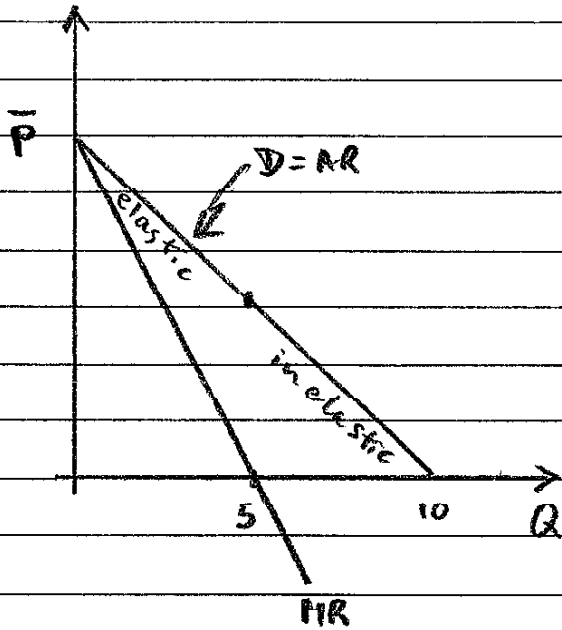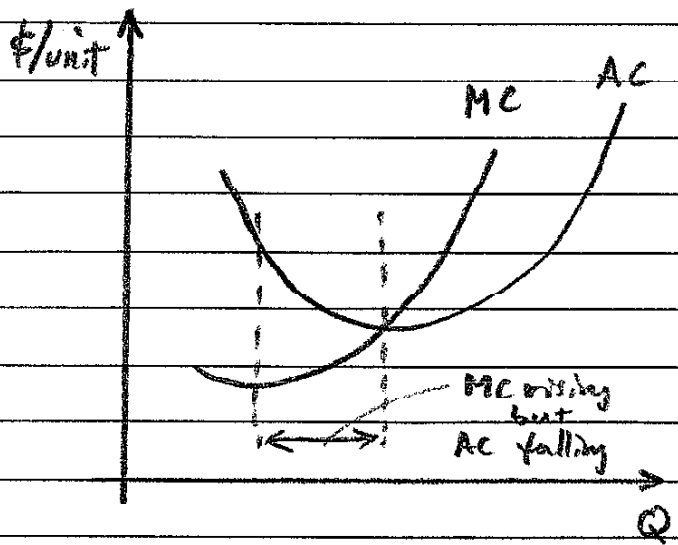
Figure 1
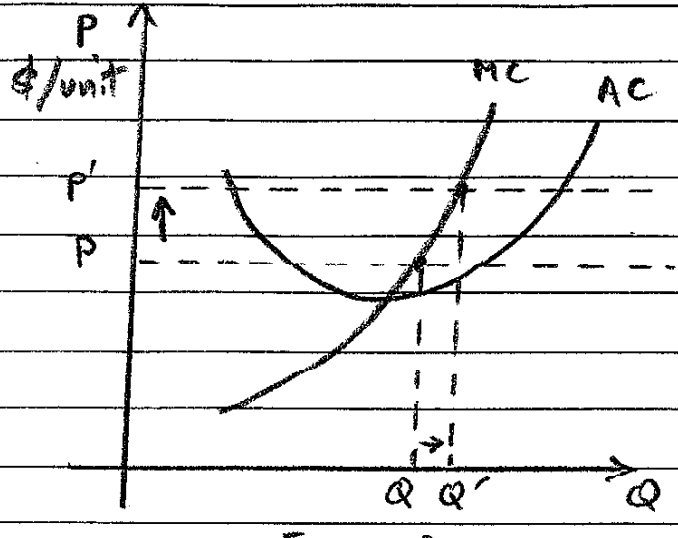
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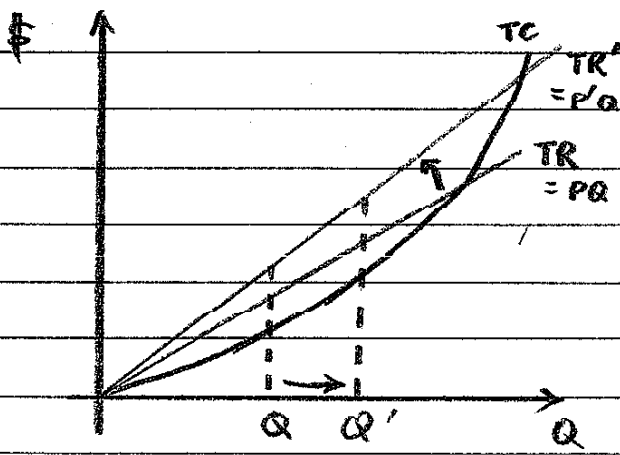
Figure 2b

Figure 3

Figure 4

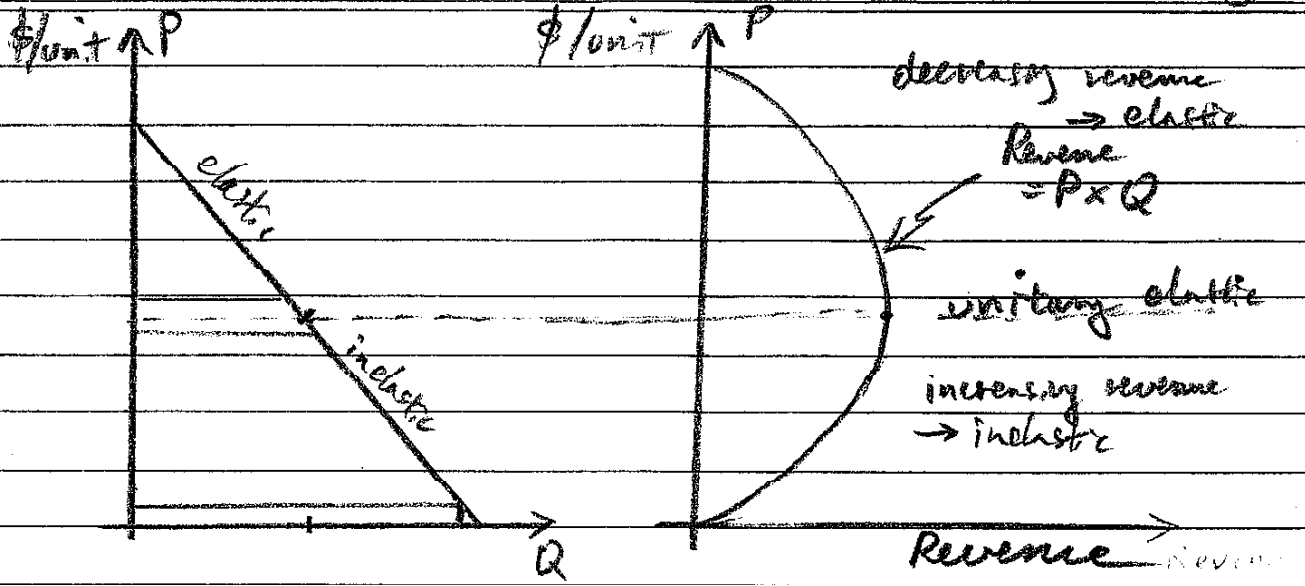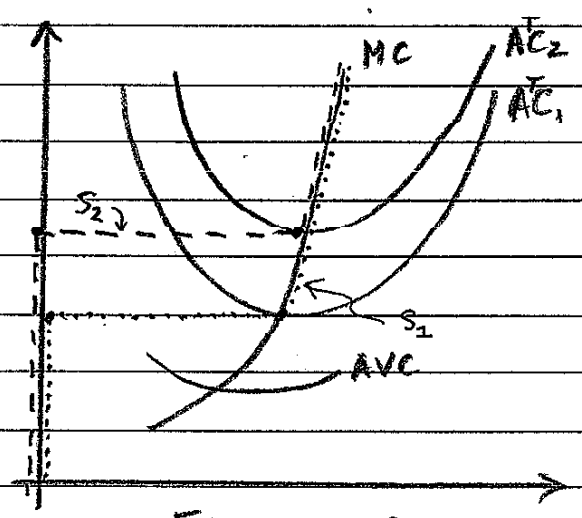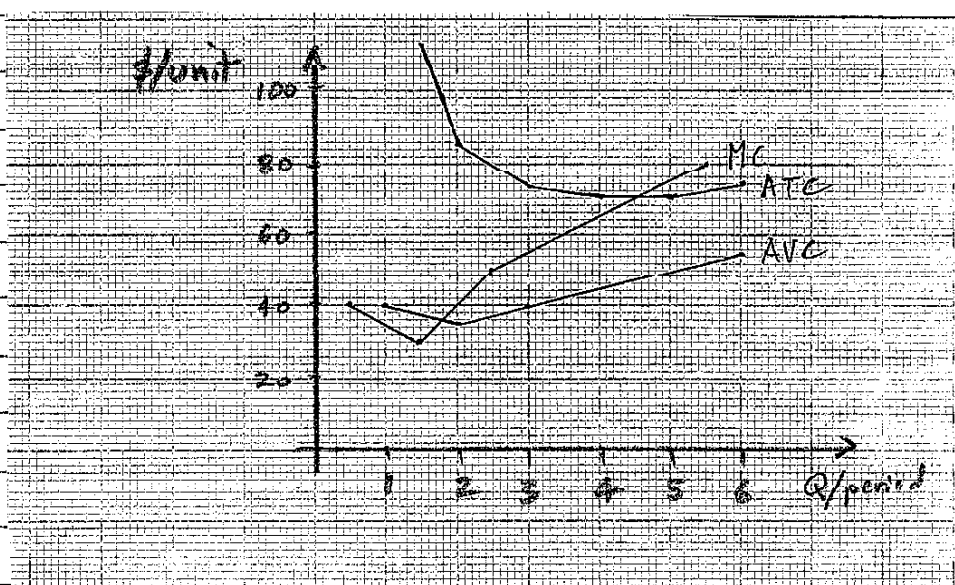Figure 6.

$/unit ↑ P $/unit ↑ P

elastic

decreasing revenue
→ elastic

Revenue
= P × Q

unitary elastic

increasing revenue
→ inelastic

inelastic

Q

Revenue

Figure 8

$/unit

AFC = $\frac{FC}{Q}$

Q

Figure 9

MC $\overline{AC}_2$
          $\overline{AC}_1$

S_2

S_1

AVC

Figure 10

$/unit

100

80

MC
ATC

60

AVC

40

20

1   2   3   4   5   6   Q/period

Figure 11

$/unit

P'
P

S

D'

D

Q Q'

Figure 14a

$/unit

P'
P

S'

S

D

Q' Q

Figure 14b

$/unit

P'
P

S'

S

D'

D

Q' Q

Figure 14c