**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 \( \pi \) is being maximised, not minimised. Indeed, rising \( MC \) is necessary for \( \pi \)-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 \( \pi \): the mark-up, and so does not set \( P(y^*) = MC(y^*) \)), and the supply curve (the maximum amount at any price that a \( \pi \)-maximising firm will offer for sale; or the minimum price at which a \( \pi \)-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 \( \tilde{P} \). We also know that the \( MR \) curve has the same price intercept (the choke price \( \tilde{P} \)), but twice the slope (−ve), so that the \( MR \) curve cuts the quantity axis at \( y = 5 \), \( MR(5) = 0 \). The \( \pi \)-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!):

<table>
<thead>
<tr>
<th>Output</th>
<th>Fixed Cost ($)</th>
<th>AFC Cost ($/unit)</th>
<th>Variable Cost ($)</th>
<th>AVC Cost ($/unit)</th>
<th>Total Cost ($)</th>
<th>ATC Cost ($/unit)</th>
<th>MC Cost ($/unit)</th>
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<td>73.3</td>
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</table>
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.)