Sketch of Answers for Micro II Set 2 Exercises

Q1: c.

Q2: a. (Because a tax on profits is neutral and does not change optimal output of the monopolist.)

Q3: a.

Q4: b.

Explanation: If a monopolist would like to maximise its profit, then the firm should take the first order condition of the profit function to be equal to zero, i.e., set marginal profit (or as we often say set marginal revenue minus marginal cost) to be zero. If a firm only sets its marginal revenue to be zero, then it simply means that the firm maximises the revenue. Of course, if the marginal cost happens to be zero, then the firm also maximises profit. But in general, we cannot conclude that this would maximise profit because marginal cost is usually not zero. So choice (a) is not correct, but the correct answer is (b).

Q5: c.

Explanation: For background of the question, please refer to the relevant slide of the lecture note, where we know the condition for maximization is $MR = p(1 + \frac{1}{\epsilon})$. Since here $MR = 20$ and $\epsilon = -2$, one can easily calculate that $p = 40$.

Q6: b.

Explanation:
To clarify why (b) is correct, firstly note that the profit-maximising production level would be 9. However, due to the fixed cost of £86, the firm would make a loss of 81-86 $= -5$ at this profit-maximising (or loss-minimising) production level. In absence of a subsidy, the firm would therefore be better off by not producing anything. Therefore, (a) and (d) are wrong. But not producing anything is not socially efficient (i.e., (c) is also incorrect). Imagine the product is priced

at the marginal cost, i.e., $p = 0$. Quantity demanded would then be equal to $q = 18 - 0 = 18$, and the resulting consumer surplus would be 162 (calculated as $\frac{1}{2}(18 \times 18) = 162$). The consumer surplus is greater than the cost of 86 incurred by the firm to provide the good. Therefore, it is socially efficient to provide the good at a price of zero and compensate the firm for its loss, for example by paying a subsidy of 91 to the firm. Therefore, (b) is correct.

A government-provided subsidy of £91 will cover the fixed cost and leave the firm with a profit of £91-86=5. Then, due to zero marginal cost, the firm is willing to produce the 18 goods that consumers demand at a price of zero. Of course consumers, as tax payers, need to pay for the subsidy. Consumers' net welfare is the consumer surplus minus the subsidy, which is $162 - 91 = 71$. Both, the firm and consumers are better off than if nothing was produced (because if nothing was produced, both would get 0). Therefore, the subsidy is a Pareto improvement over the situation of producing nothing. Net social welfare (the sum of the firm's and the consumer's net welfare) under the subsidy is $5 + 71 = 76$, whereas if nothing was produced, it would be 0.

Q7: c.

Explanation:
To understand why (c) is the right answer, firstly, you may check the relevant lecture notes, especially on the topic of 3rd-degree price discrimination. Note that the optimal condition for maximising the total profit from the two sub-markets is $MR_1 = MR_2 = MC$. Since marginal revenue can be written as $p(1 + \frac{1}{\epsilon})$, we have

$$p_1 \left(1 + \frac{1}{\epsilon_1} \right) = p_2 \left(1 + \frac{1}{\epsilon_2} \right).$$

Given that $p_2 = 11$ and $\epsilon_2 = -0.9$, we get $MR_2 = 11 \times (1 - \frac{1}{0.9}) = -\frac{11}{9} < 0$.

Based on the optimality condition, we know that a profit-maximising monopoly will produce at a level (thereby also set the corresponding price) such that the marginal revenue equals marginal cost, and marginal cost can never be negative. Therefore, the current price level in market 2 is certainly not optimal. Negative marginal revenue means that by reducing the quantity and raising the price the firm can increase its revenue, while cost also decreases when reducing the quantity. Raising the price p_2 (and selling fewer units in market 2) will therefore unambiguously increase profits. It will also lead to demand becoming more

elastic, i.e., making ϵ_2 to be less than -0.9. (Remember also from the lecture slides, that the firm will always operate in a region of the demand curve, in which demand is elastic, and marginal revenue is positive.)

Should p_1 also be changed? Not necessarily. Because $MR_1 > 0$ there is not the same problem that we identified for p_2, so p_1 might be at its optimal level. We cannot say this with certainty because we do not know the value of marginal cost, so there is not enough information to determine whether $p_1 = 6$ is optimal or not.

The only action that is **sure** to raise profit, is therefore a rise of p_2, making (c) the only correct answer.

Q8: (a) 3; (b) 2.5; (c) 3; (d) Quantity tax distorts the behavior, while profit tax is neutral. More details related to the nature of such taxes can be found in the lecture notes.

Q9:
To arrive at the answers below you will need to use the fact that, because of constant returns to scale, average cost is constant and equal to marginal cost, therefore $ATC = MC = \frac{1000000}{100} = 10000$.
(a) 250 at price £15,000 each;
(b) 150 at price £17,500 each;
(c) £2,375,000.
(d) -3;
(e) -2.33;
(f) less elastic.

Answer to Question 10:

To maximise profit, the monopoly would produce at a level that satisfies the condition of "marginal revenue = marginal cost". We know marginal revenue can be expressed as $MR = p(1 + \frac{1}{\epsilon})$. Suppose the marginal cost is k. This implies that $p = \frac{k\epsilon}{1+\epsilon}$. So, $p - k = -\frac{k}{1+\epsilon} > 0$. (Note that $\epsilon < -1$, as shown in the lecture slides.)

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