



AP[®] Microeconomics 2002 Scoring Guidelines

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Question 1

Correct Answer:

Part a: The student should recognize that Claire is a monopolist. The firm (Claire) would have a downward-sloping product demand curve with a marginal revenue curve below the demand curve. The profit-maximizing level of output would be where marginal revenue equals marginal cost. The product price would be found on the demand curve, above the profit maximizing output level. The firm's economic profit would be the rectangle bordered vertically by the distance between price (P) and average total cost (ATC) and horizontally by the output level (Q).

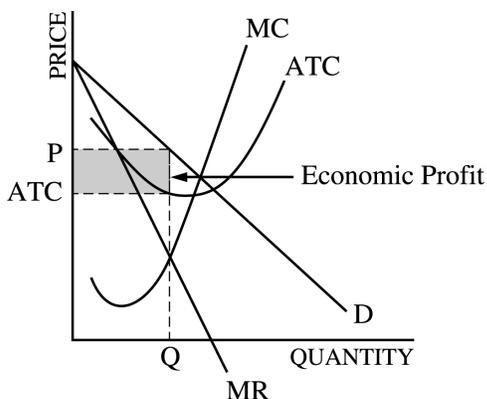
Part b: The student should show a competitive labor market with a downward-sloping labor demand curve and an upward sloping labor supply curve. There will be an equilibrium wage per unit of labor and equilibrium quantity of labor. Claire, as a wage taker, will face a perfectly elastic labor supply at the equilibrium market wage. The number of workers hired by Claire is found at the intersection of Claire's downward-sloping marginal revenue product of labor function (labor demand) and the perfectly elastic labor supply (at the market wage).

Part c: Product X is now sold in a perfectly competitive product market. The student should show a competitive output market with an equilibrium price and quantity. Claire and the other competitive firms have an output demand that is now perfectly elastic at the market-determined price of output. In the long-run equilibrium each firm will produce where the output price (also, the firm's marginal revenue) is equal to marginal cost at minimum average total cost.

Grading Rubric:

4+3+3 = 10 points for parts a, b, c

(a)



Profit-maximizing output level and price, profits - **4 points**

1 Point: correctly labeled graph with downward-sloping D and MR, with $D > MR$

1 Point: Q at $MR = MC$

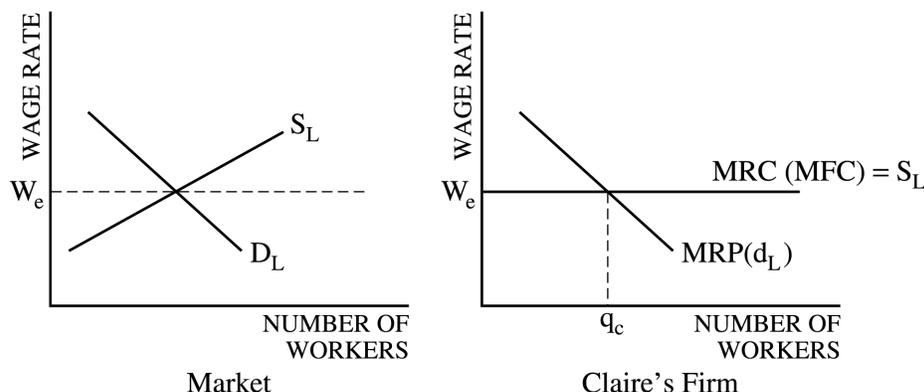
1 Point: P from D, above the $MR = MC$ point

1 Point: Profit rectangle properly shown: must use $(P - ATC) \times Q$

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Question 1 (cont'd.)

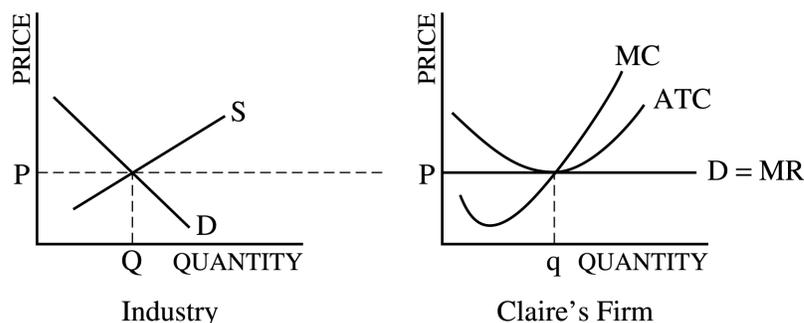
(b)



Labor hiring and wage rate – **3 points**

- 1 Point:** correctly labeled labor market graph: must have an upward-sloping labor supply and downward-sloping labor demand
- 1 Point:** correctly labeled firm graph as a part of the side-by-side graphs: must show linkage from labor market to indicate firm is a wage-taker (perfectly elastic labor supply curve) at the market wage
- 1 Point:** for the correct number of workers for Claire: where Wage (labor supply, S_L) = MRP (downward sloping labor demand curve, labeled MRP or D_L)

(c)



Product Market-perfect competition – **3 points**

- 1 Point:** correctly labeled graph of the market: showing equilibrium price and quantity of output
- 1 Point:** correctly labeled graph of the firm as a part of the side-by-side graphs: must show linkage from the product market to indicate that the firm is a price-taker (perfectly elastic demand curve at the market output price)
- 1 Point:** showing the firm's output level where $MR=MC$ at minimum ATC

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Question 1 (cont'd.)

Commentary:

This long microeconomics question tested the student's understanding of both output and input markets, as well as the linkage between the market and the individual firm. Also, the question included two different market structures, monopoly and perfect competition. The question was quite effective in separating across different grading points. As a general observation, it should be noted that too many students seemed unaware of the meaning of side-by-side graphs, needed in parts b and c. To show convincingly the links between a market and an individual competitive firm, these graphs are necessary.

Too frequently the student's labor market graph could not be distinguished from the output market graph; the student would have Q on the vertical axis and P on the horizontal axis for both graphs.

In both parts b and c, students frequently did not separate the market from the individual firm. A critical concept in perfect competition, both in the labor market and in the output market is that of "price taking." For the firm hiring labor in a perfectly competitive labor market, the price of labor becomes the firm's perfectly elastic labor supply, with the individual firm able to hire all the labor it wishes at the market-determined wage. Similarly, in the output market, the individual firm faces a perfectly elastic product demand at the market-determined output price.

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Question 2

Correct Answer:

Part a: Within the chemical industry (or market) at the unregulated level of output the marginal social cost of production exceeds the marginal social benefit. In other words, with this negative externality, there is an over allocation of resources to the chemical industry; the level of output is greater than the efficient level. The government should introduce a per unit tax on output, raising the marginal private cost of production and reducing output. Alternatively, the government could introduce some measure to reduce directly the level of output.

Part b: National defense is a public good. Individuals have an incentive to withhold their true demand or willingness to pay for the good, i.e., the free-rider problem. Thus, at the level of output produced the marginal benefit of national defense exceeds the marginal cost of national defense; there is an under allocation of resources to national defense. The government could assume production of national defense and tax all members of the society to pay for the national defense. Or, a per-unit subsidy to private producers would lead to an increase in the output of national defense.

Grading Rubric:

6 Points = 3 in part a + 3 in part b

(a) Chemical industry and pollution (**3 points**)

(i) Acceptable answers include: (**1 point**)

- Too much output
- Over allocation of resources to the market
- Showing higher than efficient output on graph

Acceptable answers include: (**1 point**)

- $MSC > MSB$ at the unregulated output
- $MSC > MPC$
- $MC > MB$ with term “negative externality”

(ii) Acceptable answers include: (**1 point**)

- Tax on output
- Quantity restriction
- Permits
- Liability and lawsuit

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Question 2 (cont'd.)

(b) National Defense (**3 points**):

(i) Acceptable answers include: (**1 point**)

- Too little produced
- Under allocation of resources
- Showing lower than efficient output on graph

Acceptable answers include: (**1 point**)

- $MSB > MSC$ at the unregulated output
- $MSB > MPB$
- Free-rider problem

(ii) Acceptable answers include: (**1 point**)

- Public production of national defense
- Tax to finance public production of national defense
- Subsidy, if there are private producers of national defense

Commentary:

We began this question reminding students that an efficient allocation of resources occurs when the marginal social cost equals the marginal social benefit. Students then had to assess two situations in which an efficient allocation of resources does not occur and to explain why inefficiency exists.

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Question 3

Correct Answer:

Part a: The utility-maximizing consumer will exhaust her income, purchasing quantities of each good such that for each commodity the marginal utility of the last unit purchased divided by the price of the commodity is equal. This consumer will purchase 3 apples and 2 oranges. The marginal utility per dollar of each commodity is equal: 10/\$1 for apples and 20/\$2 for oranges.

Part b: With the increase in income, the consumer will now purchase 4 apples and 4 oranges and have 125 utils (50 from apples and 75 from oranges).

Part c: With the increase in the price of oranges, the consumer will now purchase 4 apples and 2 oranges and have 100 utils (50 from apples and 50 from oranges).

Grading Rubric:

Part a, b, and c each worth 2 points for 6 points in total

(a) 3 apples and 2 oranges **(1 point)**

Marginal analysis: equalization of MU/\$ or $10/1$ (apples) = $20/2$ (oranges) **(1 point)**

Note: The student may not simply use the maximizing of total utility for the explanation.

(b) 4 apples and 4 oranges **(1 point)**

$50+75 = 125$ utils **(1 point)**

(c) 4 apples and 2 oranges **(1 point)**

$50+50 = 100$ utils **(1 point)**

Note: For parts b and c, the reader must work with the student's apple/orange combination and award a point if the total utility is consistent with that combination.

Commentary:

Students were able to receive 2 of 6 points for calculating the correct amount of total utility from two incorrect apple and orange combinations. Far too few students were able to apply the utility-maximizing rule of equalizing the marginal utility per dollar for each commodity.