

Problem 1: State whether each statement is true or false and explain why.

- (1) Monopolists can charge whatever price they want and maximize profit since they are price makers.
False. Like all firms, monopolists maximize profit by equating marginal cost and marginal revenue. The term “price makers” refers to the ability of monopolists to affect the price being charged in contrast to firms in a perfectly competitive market who can not choose to sell their goods at a higher price.
- (2) A firm that has a monopoly on a certain good must worry about the actions of other firms who sell close substitutes.
False. A firm is not a monopolist if other firms exist who sell close substitutes.
- (3) Average Total Cost is the change in output over the change in quantity produced.
False. Average total cost is the total cost divided by the quantity produced.
- (4) Perfectly competitive firms will receive normal economic profit in the long run regardless of the decisions they make.
True. It is not possible for a firm in a perfectly competitive market to earn other than normal economic profit (zero).
- (5) Rent-seeking is taken into account when calculating the deadweight loss from a monopolist market structure.
False. The costs from rent seeking (time spent not engaging in other productive activities, for example) are not taken into account when calculating deadweight loss.
- (6) The market for wheat is an example of a perfectly competitive market.
True. Wheat is a homogenous good with many firms--no wheat grower owns enough of the wheat market to have enough market power to affect the market price.
- (7) A firm has a marginal revenue function: $MR(q) = 4q + 5$. This firm is in a perfectly competitive market.
False. Marginal revenue is constant in a perfectly competitive market (and equal to price). If a firm can change their marginal revenue by choosing the quantity they output, the market is not perfectly competitive.

Problem 2: The marginal revenue and marginal cost functions for a monopolist firm that mines diamonds are given by:

$$MC(q) = 2 + 2q$$

$$MR(q) = 10 - 2q$$

- (1) What is the inverse demand for diamonds?
Assume the inverse demand curve is linear. Since the marginal revenue function for a monopolist with a linear inverse demand curve has twice the slope and the same intercept => $P = 10 - Q$ is the inverse demand.
- (2) What is the profit-maximizing level of output?
As noted in Problem 1: profit-maximization occurs when $MC = MR$. So we get: $8 = 4q \Rightarrow q = 2$ is the optimal quantity.
- (3) Which price does the monopolist charge at this level of output?
In order to find the price charged to consumers, we plug $q = 2$ into the inverse demand curve in order to find the price at which consumers are willing and able to consume 2 units. $P = 10 - 2 \Rightarrow P = 8$.

- (4) If $TC(q) = 2 + 2q + q^2$, what equation defines TFC, TVC, ATC?
 $TC(q) = 2 + 2q + q^2$. Since fixed cost is the same regardless of quantity: $TFC = 2$. TVC is the total cost associated with changes in the level of output, so: $TVC = 2q + q^2$. Lastly, $ATC = TC / q \Rightarrow ATC = 2/q + 2 + q$.
- (5) Does the monopolist make economic profit? How much profit/loss does the firm earn?
 The revenue for the monopolist is the optimal price times the optimal quantity $\Rightarrow TR = 8 \cdot 2 = 16$. The total cost at the optimal quantity is: $TC(2) = 2 + 2 \cdot 2 + 4 = 10$. So, profit is given as: $TR - TC = 6$. So, yes the firm makes economic profit.
- (6) What is the economic profit if instead fixed costs were 8? What if they were 10?
 If the fixed costs were instead 8 (10), the marginal cost (the cost of producing an additional unit) would not change so the same optimal quantity would be produced $\Rightarrow TR = 16$ and $TC = 8 + 4 + 4 = 16$ ($TC = 10 + 4 + 4 = 18$). Economic profit would be 0 (-2).
- (7) What does this tell us about a monopolist's profit and the costs of obtaining a monopoly?
 It tells us two things: first, monopolies may be expensive to acquire; secondly, it tells us that certain types of monopolies may have very high fixed costs for reasons unrelated to the market structure. For example, a utility company may have large fixed costs and so earn negative economic profit even though they are the only firm in the market.
- (8) Draw a graph that displays the three scenarios implied by the different fixed costs in this problem, and label the consumer surplus, producer surplus, and deadweight loss.
 This is the graph from class labeled the monopolist picture. The important curve for the different types of profit is the ATC. Draw one so that at the optimal quantity the ATC curve is below the consumer's price (profit), another so that the curve is at the consumer's price (normal profit), and draw one that is above the consumer's price (loss).

Problem 3: The market for apples is perfectly competitive. Say a typical firm has a marginal cost function of $MC(q) = 2q$.

- (1) The optimal quantity of apples to produce is 10 for the typical firm. How much revenue does the firm earn?
 Since all firms equate marginal revenue and marginal cost, and the market for apples is perfectly competitive: $MR = P = MC = 2q \Rightarrow q = 2P$. So, if the optimal quantity is 10 $\Rightarrow 10 = 2P \Rightarrow P = 5$. So, the revenue of the firm is: $5 \cdot 10 = 50$.
- (2) In the short run, what condition causes a perfectly competitive firm to shut down? Will a firm remain in the apple business if they are incurring a loss?
 In the short run, a firm will shut down if it can not earn more than its variable costs. Fixed costs do not factor in to the short run decision to close down since fixed costs must be paid no matter what, even if the firm closes. Therefore, even if a firm is making a loss, it may stay in business in the short run if it can cover its variable costs.
- (3) Graph the progression of a typical firm in the apple business from positive to normal economic profits.
 This is the graph from class of the short run ATC moving along the long run average total cost until, eventually, the firm faces rising long run average total costs.

Problem 4: (Fun Question) Imagine there is a market for buying monopolies which is perfectly competitive and at its long run equilibrium. Assume all firms in this market have only two options: run the monopoly themselves or sell it. What is the profit the monopolies will make after they are purchased?

Since the firms in the market for monopolies have only two decisions: to run the firm themselves or sell it; the costs for the firms selling monopolies are entirely opportunity cost, which is: the profit they could make from running the monopolies themselves. Since in the long run all firms in a perfectly competitive market make zero economic profit, the firms will sell the monopolies at a price equal to the profit they would have made from running the firms.

While this example is extreme, it is an example of a market that, in the long run, predicts the profitability of a firm. Such markets exist in real life. For example: the stock market.