

Extra Business Problems #1

MATH 104

September 16, 2020

1. When EZ Electronics Company sells surge protectors at \$50 a piece, they produce and sell 3000 of them per month. For every \$1 increase in price, the number of surge protectors they sell decreases by 15. Assume that the fixed production costs are \$50,000 and the variable costs are \$30 per surge protector.
 - (a) Find the linear demand function $q = D(p)$, where p is a price of a unit and q is the number of surge protectors made and sold. [Hint: The point $(p, q) = (50, 3000)$ must lie on this line.]
 - (b) Find the cost function $C(q)$ as a function of q , and then express it as a function of p .
 - (c) Find the revenue function $R(q)$ as a function of q , and then express it as a function of p .
 - (d) Find the *break-even points*. Give both the price p and quantity q at each of these points.
 - (e) If EZ Electronics Company is operating at the higher break-even point, should it increase or decrease the price of its surge protectors to increase its profits? Explain your answer.
2. Tellyou Phone Company produces cell phones based on a cost function given by $C(q) = 300q + 40000$, where q is the quantity of cell phones made and sold each day. Suppose that their accountants have determined that their revenues are given by the function $R(q) = 800q - q^2$.
 - (a) What are the *break-even* points for the Tellyou Phone Company?
 - (b) A company is *profitable* if the profit function is positive. Sketch the profit function for the Tellyou Phone Company. What is the range on the number of cell phones the Tellyou Phone Company should make and sell in order to be profitable? Give an exact answer and also indicate this range on your sketch.
 - (c) If Tellyou Phone Company currently is producing 300 cell phones per day, will increasing their production increase their profit? Explain your answer mathematically using marginals.
 - (d) What is the demand function for the Tellyou Phone Company?

$$pq = R(q) = 800q - q^2 \Rightarrow p = 800 - q$$

$$q = D(p) = -p + 800$$

3. One of the reasons that companies may lower costs in the long-run is they benefit from *learning-by-doing*, which is the productive skills and knowledge of better

ways to produce that workers and managers gain from experience. Suppose that a company's average cost is $AC(q) = \alpha q^\beta$, where $\alpha > 0$, and q is the company's output. How can you interpret α in terms of the business? (*Hint:* Suppose that $q = 1$.) What sign must β have if there is learning-by-doing? What happens to the average cost as q gets large Draw the average cost curve as a function of output q for a particular set of values α and β .

4. The FlipIt Novelty Company estimates that it can sell 2000 pet rocks per month if it sets a unit price of \$5.00. FlipIt estimates that for each \$0.20 decrease in price per unit, its sales of pet rocks will increase by 200 per month.
 - (a) Find the demand function for pet rocks.
 - (b) Find the revenue function for pet rocks.
 - (c) Find the number of pet rocks FlipIt should sell per month in order to maximize the monthly revenue.
 - (d) What is the maximum monthly revenue from the sales of pet rocks?