Ch 1.5 APPLICATIONS LINEAR MODELS: ANSWERS
COST AND REVENUE FUNCTIONS: PROFIT AND LOSS; BREAK-EVEN POINTS

4 At Tony's Pizza Palace the fixed cost of making pizzas for one day is $300. The variable cost to make a pizza is $5 per pizza.

a. Write the cost function for the total cost as a function of the number of pizzas made.

x = number of pizzas y = cost of making x pizzas

Cost function is $y = C(x) = 300+5x$

b. If Tony expects to sell 60 pizzas on a typical day, what should he charge for a pizza in order to at least cover his costs?

$C(60) = 300 + 5(60) = \$600$ cost of making 60 pizzas

Tony needs to charge $\frac{\$600}{60\text{pizzas}} = \$10$ per pizza in order to break even

c. If Tony sells pizzas for $15 each, how many pizzas does he need to sell in order to break even?

Cost Function: $C(x) = 300 + 5x$

Revenue Function: $R(x) = 15x$

Break Even when Revenue = Cost

$$R(x) = C(x)$$
$$15x = 300 + 5x$$
$$10x = 300$$
$$x = 30$$

d. If Tony sells 20 pizzas for $15 each, what is his loss?

$R(20) – C(20) = 15(20) – (300 + 5(20)) = – 100$

$ 100 loss

e. If Tony sells 50 pizzas for $15 each, what is his profit?

$R(50) – C(50) = 15(50) – (300 + 5(50)) = 750–550 = 200$

$ 200 profit

5. A factory makes decorative cell phone cases in a variety of designs. For any single design, it costs $2000 to produce 100 cell phone cases and it costs $5000 to produce 500 cell phone cases.

a. Find the fixed and variable costs and write the cost function for producing cell phone cases.

$(x_1,y_1) = (100, 2000)$ $(x_2,y_2) = (500, 5000)$

$$m = \frac{(5000 – 2000)}{(500 – 100)} = 7.50$$

$y – 2000 = 7.50(x–100)$

Cost function is $y = C(x) = 7.50x + 1250$ when simplified

b. Suppose that the cell phone cases sell for $10 each. Find the revenue function.

Revenue Function: $y = R(x) = 10x$

c. How many items must be sold to break even?

Break Even when Revenue = Cost

$$R(x) = C(x)$$
$$10x = 1250 + 7.5x$$
$$2.5x = 1250$$
$$x = 500 \text{ cell phone cases}$$

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6. Keisha makes jewelry and sells it online on Etsy. It costs her $350 to produce 10 bracelets and it costs her $950 to produce 40 bracelets. Keisha sells her bracelets for $27.50 each. Find the cost and revenue functions and use them to determine how many she needs to sell in order to break even.

$(x_1,y_1) = (10, 350)$ $(x_2,y_2) = (40, 950)$

$m = \frac{(950-350)}{(40-10)} = 20$

$y - 350 = 20(x-10)$

Cost function is $y = C(x) = 20x + 150$ when simplified

Revenue Function: $R(x) = 27.50\ x$

Break Even when Revenue = Cost

$$R(x) = C(x)$$
$$27.50\ x = 20x + 150$$
$$7.5x = 150$$
$$x = 20$$