

## Campus Academic Resource Program

### Practice Problems

## Practice Problems for “Definitions of Cost-Revenue-Profit Functions Using Linear Equations”

### Questions:

1). We are provided a cost function,  $C(x) = 12x + 14$ , by a firm that manufactures shoes.

**What is the fixed cost? What is the variable cost?**

2). A firm is trying to create a cost function to represent the costs of producing denim jeans. They figure that the general cost of operating the machines for a whole day is \$120, regardless of how many jeans they make that day. In addition to this, they figure that each pair of jeans will cost about \$13 to make (for cost of materials, cost of labor, etc).

**What is the fixed cost? What is the variable cost? Create a cost function**

3). A firm is planning on producing 7 units of  $x$  and has created a cost function,  $C(x) = 14x + 35$ , to estimate their general costs of production. How much will it cost the firm to produce the 7 units?

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### Practice Problems

4). A video game manufacturer has created the following cost and revenue functions to track the cost and revenue from the sales of their brand new game:

$$C(q) = 18q + 80$$

$$R(q) = 30q$$

**Generate a profit function** using these two equations. (Remind yourself what the relationship between cost, revenue, and profit is.)

5). Using the Profit function from problem 4:

a) Would the video game manufacturer make a **gain or a loss** from **producing a quantity of 5 video games**? **How much?**

Producing 5 video games results in a \_\_\_\_\_ of \_\_\_\_\_.

b) Would the video game manufacturer make a **gain or a loss** from **producing a quantity of 12 video games**? **How much?**

Producing 12 video games results in a \_\_\_\_\_ of \_\_\_\_\_.

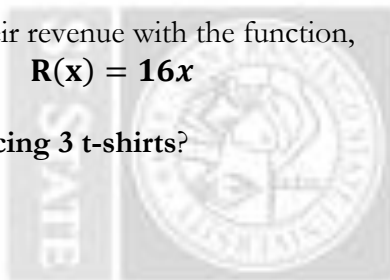
## Campus Academic Resource Program

### Practice Problems

- 6.) A stand that sells t-shirts estimates their revenue with the function,

$$R(x) = 16x$$

What's the **revenue from producing 3 t-shirts?**



- 7). Suppose a firm has a profit function of,

$$P(x) = 27x - 297$$

How much output would they have to produce **to break even** (what is the break-even point)?

If the firm produces \_\_\_\_\_ units, they will break even and have profits of zero (they will have neither any gains in profits nor any losses in profits)

## Campus Academic Resource Program

### Practice Problems

8). How many units would a company have to produce in order to gain profits of \$87

Given the profit functions

$$P(x) = 7x + 24$$

**Hint:** we don't know how many units of  $x$  we need yet, but we do know that profits have to be \$87. So we know that:  $P(?) = \$87$

("?" meaning some unknown value of  $x$  we are solving for)

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### Practice Problems

#### Solutions:

1). We are provided a cost function,  $C(x) = 12x + 14$ , by a firm that manufactures shoes. What is the fixed cost? What is the variable cost?

$$\text{Total Cost, } C(x) \rightarrow C(x) = (m * x) + b = (\text{Variable Cost} * \text{Output}) + \text{Fixed Cost}$$

Fixed cost: \$14

Variable cost: \$12

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2). A firm is trying to create a cost function to represent the costs of producing denim jeans. They figure that the general cost of operating the machine for a whole day is \$120, regardless of how many jeans they make that day. In addition to this, they figure that each pair of jeans will cost about \$13 to make (for cost of materials, cost of labor, etc).

What is the fixed cost? **Fixed cost: \$120**

What is the variable cost? **Variable cost: \$13**

Create a Cost Function:

$$\text{Total Cost, } C(x) \rightarrow C(x) = (m * x) + b = (\text{Variable Cost} * \text{Output}) + \text{Fixed Cost}$$

$$C(x) = 13x + 120$$

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3). A firm is planning on producing 7 units of  $x$  and has created a cost function,  $C(x) = 14x + 35$ , to estimate their general costs of production. How much will it cost the firm to produce the 7 units?

Units of Output:  $x = 7$

$$C(x) = 14x + 35$$

Plug in the amount of output,  $x$ , and simplify

$$C(7) = 14(7) + 35$$

$$C(7) = 98 + 35$$

$$C(7) = 133$$

**It will cost the firm \$133 to produce 7 units of output.**

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4). A video game manufacture has created the following cost and revenue functions to track the cost and revenue from the sales of their brand new game:

$$C(q) = 18q + 80$$

$$R(q) = 30q$$

Generate a profit function using these two equations. Remember what the relationship between cost, revenue, and profit is.

$$P(q) = ?$$

$$P(q) = R(q) - C(q)$$

$$P(q) = [30q] - [18q + 80]$$

$$P(q) = [30q] - 18q - 80$$

$$P(q) = 12q - 80$$

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5). Using the Profit function from problem 4:

Would the video game manufacturer make a gain or a loss from producing 5 video games?  
How much?

$$P(q) = 12q - 80$$

$$P(5) = 12(5) - 80$$

$$P(5) = 60 - 80$$

$$P(5) = -20$$

**Producing 5 video games results in a loss of \$20**

Would the video game manufacturer make a gain or a loss from producing 12 video games?  
How much?

$$P(x) = 12x - 80$$

$$P(12) = 12(12) - 80$$

$$P(12) = 144 - 80$$

$$P(12) = 64$$

**Producing 12 video games results in a profit of \$64**

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6.) A stand that sells t-shirts estimates their revenue with the function,

$$R(x) = 16x$$

What's the revenue from producing 3 t-shirts?

$$R(3) = 16(3)$$

$$R(3) = 48$$

**Revenue from producing 3 t-shirts is \$48**

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7.) Suppose a firm has a profit function of,

$$P(x) = 27x - 297$$

How much would they have to produce to break even (what is the break-even point)?

$$P(x) = 27x - 297 = 0$$

We set profits equal to zero to abide by the definition of the break-even point.

This is where Revenue equals cost [  $R(x) = C(x)$  ] and profits are zero

**solve for x:**

$$27x - 297 = 0$$

$$27x = 297$$

$$x = 11$$

If the firm produces 11 units, they will break even and have profits of zero (they will have neither any gains in profits nor any losses in profits)

## Campus Academic Resource Program

### Practice Problems

8). How many units would a company have to produce in order to gain profits of \$87

Given the profit functions

$$P(x) = 7x + 24$$

**Hint:** we don't know how many units of  $x$  we need but we know profits have to be \$87.  
So we know that:  $P(?) = \$87$

$$P(x) = 7x + 24 = 87$$

$$7x + 24 = 87$$

$$7x = 63$$

$$x = 9$$