MATH 105 **LINEAR FUNCTIONS**

Cost functions specify the cost C as a function of the number of items, x. We can write the cost function as a linear function in the form: y = $C(x) = mx + b$ where mx is the variable cost and the y-intercept, b, represents the fixed costs.

EXAMPLE 1: The manager of a refrigerator factory notices that on Monday it cost the company $25,000 to build 30 refrigerators and on Tuesday, it cost the company $30,000 to build 40 refrigerators.

a) Find a linear cost function based on this information.

Given two points of a line, the slope of the line can calculated by $m = \frac{y_1 - y_2}{x_1 - x_2}$

Given a point on a line and the slope of that line, the equation of the line can be found by using the *point-slope form* $y - y_1 = m(x - x_1)$ or $y - y_2 = m(x - x_2)$ Find the equation of the cost function.

y = C(x) = _____

b) What is the daily fixed cost? _____

What is the cost to manufacture per item? _____. This is called the *Marginal Cost*.

It is actually the <u>rate of change</u> of the cost <u>per item</u> built.

c) The *revenue* that results from business transactions the is total payment received, also called the gross proceeds. The revenue function is the linear function resulting from the number of items built and sold multiplied by the selling price per item, $R(x) = x \cdot p$. If this company sells its refrigerators for $1500 per unit, give the revenue function.

R(x) = _____

d) The *profit* is the *net proceeds*, or what remains of the revenue after the costs are subtracted. Find is the profit function.

P(x) = R(x) - C(x) = _____

MATH 105 **THE SLOPE OF A STRAIGHT LINE**

EXAMPLE 1. A manufacturer finds that the total cost of producing x units of a commodity is *2x + 1000* dollars

a) give the coordinates of the y-intercept of the line y = 2x + 1000 _____

b) Give the interpretation of the y-intercept in the example, referring to the number of units produced , x, and the total cost, y, of producing those units.

_____

_____

c) What is the slope of the line y = 2x + 1000 ? m = ____

d) Give the interpretation of the slope, referring to the number of units produced,x, and the total cost, y, of producing the units.

_____

_____

e) complete the chart: *QUANTITY PRODUCED* *TOTAL COST*

x = 1500	_____
x = 1501	_____
x = 1502	_____

f) Each time that x is increased by 1, the value of y increases by ____.

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Example 2. An apartment complex has a storage tank to hold its heating oil. The tank was filled to capacity (30, 000 gallons) on January 1st. The oil level in the tank drops at the rate of 400 gallons per day. Assume a linear relationship between the number of days, t, after January 1 and the number of gallons of fuel oil in the tank, g. Give the linear equation that expresses the relationship between t and g.

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