

# Chapter 1.9: Modeling with Functions

Writing functions/equations to model a word problem so that one may solve it visually or algebraically.

You are choosing between two long-distance telephone plans. Plan A has a monthly fee of \$20 with a charge of \$.05 per minute for all long-distance calls. Plan B has a monthly fee of \$5 with a charge of \$.10 per minute for all long-distance calls.

- a. Express the monthly cost for the plans as a function of  $x$ , number of minutes.

$$f(x) = .05x + 20 \quad g(x) = .1x + 5$$

- b. For how many minutes will the costs for the plans be the same? Which plan will be better?

$$\begin{aligned} .05x + 20 &= .1x + 5 \\ (300, 35) &\text{ when } = \\ \text{Both good} \end{aligned}$$

On a certain route, an airline carries 6000 passengers per month, each paying \$200. A market survey indicates that for each \$1 increase in the ticket price, the airline loses 100 passengers.

$$-100(x-200)$$

a. Express the number of passengers per month,  $N$ , as a function of the ticket price.

$$N(x) = 6000 - 100x + 20000$$

$$N(x) = -100x + 26000$$

b. The airline's monthly revenue for the route is the product of the number of passengers and the ticket price. Express the monthly revenue,  $R$ , as a function of the ticket price,  $x$ .

$$R(x) = x(-100x + 26000)$$

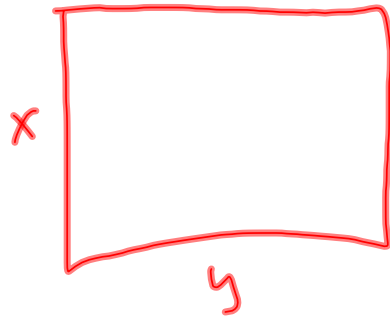
A machine produces open boxes using square sheets of metal measuring 12 inches on each side. The machine cuts equal squares from each corner. Then it shapes the metal into an open box by turning up the sides.

a. Express the volume of the box,  $V$ , as a function of the length of the side of the square cut from each corner,  $x$ .

$$V(x) = (12 - 2x)(12 - 2x)x$$

b. Find the domain of  $V$ .

You have 140 yards of fencing to enclose a rectangular garden. Express the area of the garden,  $A$ , as a function of one of its dimensions,  $x$ .



$$\frac{2x + 2y = 140}{2}$$

$$A(x) = xy$$

$$x + y = 70$$

$$y = 70 - x$$

$$A(x) = x(70 - x)$$

A cylindrical soft-drink can has a volume of 12 fl oz. which is about 22 cubic inches. Express the surface area of the can,  $A$ , as a function of the radius.

You inherit \$16,000 with the stipulation that for the first year the money must be placed in two investments expected to pay 6% and 8% annual interest, respectively. Express the expected interest,  $I$ , as a function of the amount of money invested at 6%,  $x$ .

Express the distance,  $D$ , a point is from the origin to the graph  $y=1-x^2$  as a function of  $x$ .

Homework: Chapter 1.9 pg.228  
#'s 1,5,7,9,13,19,27