

Name: SOLUTIONS

Chapter 1 – Section 1.4 Formulas for Linear Functions Part 1

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

Write the general formula for the equation of a line in

- o Slope-intercept form

$$y = mx + b$$

- o Point-Slope form

$$y - y_1 = m(x - x_1)$$

- o Standard form

$$Ax + By + C = 0 \text{ or } Ax + By = C$$

Check your understanding:

Find the formula for the linear functions:

1. $P = h(t)$ give the size of a population that begins with 12,000 members and grows by 225 members each year.

$$P = h(t) = 12000 + 225t$$

2. A new Toyota RAV4 cost \$21,500. The car's value depreciates linearly \$3200.00 per year.

$$V = T(t) = 21500 - 3200t$$

3. In 2006, the population of a town was 18,310 and growing by 58 people per year.

$$P = f(t) = 18310 + 58t$$

4. The following table gives the cost $C(n)$ of producing a certain good as a linear function of n , the number of units produced.

n (units)	100	125	150	175
$C(n)$ dollars	11000	11125	11250	11375

$(100, 11000)$ & $(125, 11125)$

$$m = \frac{11125 - 11000}{125 - 100} = \frac{125}{25} = 5$$

$$m = 5; (100, 11000)$$

$$y - 11000 = 5(x - 100)$$

$$y - 11000 = 5x - 500$$

Write the following linear equations in $y = mx + b$ form:

5. $5x - 3y = 20$

$$-3y = -5x + 20$$

$$y = \frac{5}{3}x - \frac{20}{3}$$

$$y = 5x + 10500$$

6. The equation that passes through the points $(-1, 5)$ and $(2, -1)$.

$$m = \frac{-1 - 5}{2 - (-1)} = \frac{-6}{3} = -2$$

$$y - 5 = -2(x - (-1))$$

$$C(n) = 5n + 10500$$

$$y - 5 = -2(x + 1)$$

$$y - 5 = -2x - 2 \Rightarrow y = -2x + 3$$

7. The function f that has $f(0.3) = .8$ and $f(0.8) = -0.4$.

Sol: $(0.3, 0.8)$ & $(0.8, -0.4)$

$$m = \frac{-0.4 - 0.8}{0.8 - 0.3} = \frac{-1.2}{0.5} = -2.4$$

$$y - 0.8 = -2.4(x - 0.3)$$

$$y - 0.8 = -2.4x + 0.72$$

$$y = -2.4x + 1.52$$

Chapter 1 Section 1.4 Formulas for Linear Functions Part 2

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

- Two linear are parallel if and only if their slopes are SAME.
- Two lines are perpendicular if and only if their slopes are OPPOSITE RECIPROCAL.

Check your understanding:

1. Find the equation of the vertical line that passes through the point (4, -9).

Sol. VERTICAL LINE: $x = c \Rightarrow \boxed{x = 4}$

2. Find the equation of the horizontal line that passes through the point (3, 5).

Sol. HORIZONTAL line: $y = c \Rightarrow \boxed{y = 5}$

3. Write the equation of the line perpendicular to $y = 4 - \frac{3}{4}x$ and goes through the point (-3, -5).

$m = -\frac{3}{4}$

- a. Point-Slope Form

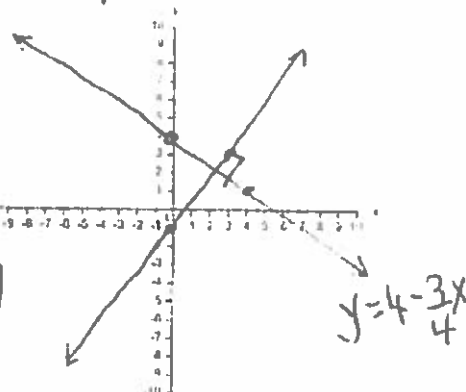
Sol. $m = \frac{4}{3}; (-3, -5)$
 $y - (-5) = \frac{4}{3}(x - (-3))$

- b. Slope Intercept Form

Sol. $y + 5 = \frac{4}{3}(x + 3) \Rightarrow y + 5 = \frac{4}{3}x + 4$
 $y = \frac{4}{3}x - 1$

- c. Graph both lines on the same axis

Sol. see the graph



Chapter 1 Section 1.5 Geometric Properties of Linear Function

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

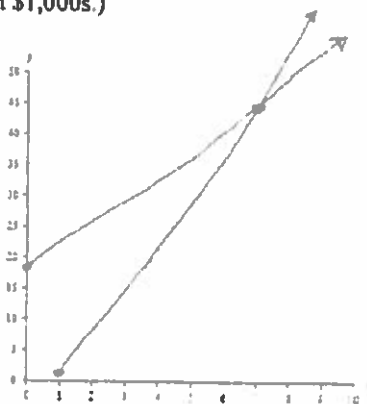
List the three methods for solving a system of linear equations

1. GRAPHING METHOD: Relies on graphing both lines & finding pt. of intersection
2. SUBSTITUTION METHOD: Relies on having one variable isolated.
3. Elimination/Addition: Relies on having one variable eliminated.

Check your understanding:

1. Franklin Meadows is considering opening a lumber business. He estimates that his total expenses will be represented by the formula $M_{\text{expenses}} = 19.8 + 3.6x$ and that his total sales will be estimated by the formula $M_{\text{sales}} = 7.2x - 5.4$. (Where x is the number of years the business has been operating and M is in \$1,000s.)

x	M _{exp.}
0	19.8
7	45



x	M _{sales}
1	1.8
7	45

Graph both equations. How many years will it take for Franklin's sales to equal his expenses?

According to the graph, it takes 7 years for Franklin's sales to equal his expenses.

2. Solve the system by substitution equal expenses.

$$3x - 5y = -10 \quad (1)$$

$$4x + y = 25 \quad (2)$$

Sol. Isolate "y" from eq (2):

$$4x + y = 25$$

$$y = -4x + 25 \quad (3)$$

3. Solve the system by elimination.

$$3(x - 3y = 8)$$

$$-4x + 9y = -26$$

Sol.

$$3x - 9y = 24$$

$$-4x + 9y = -26$$

$$-x = -2$$

$$x = 2$$

Sub $x=2$ in eq (1)

$$x - 3y = 8$$

$$2 - 3y = 8$$

$$-3y = 6$$

$$y = -2$$

$$(2, -2)$$

Sub. eq (3) in eq (1)

$$3x - 5y = -10$$

$$3x - 5(-4x + 25) = -10$$

$$3x + 20x - 125 = -10$$

$$23x - 125 = -10$$

$$23x = 115$$

$$\frac{23}{23} \frac{115}{23}$$

$$x = 5$$

Sub $x=5$ in eq (3)

$$y = -4(5) + 25$$

$$y = -5$$

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

Check your understanding:

1. $A = f(s) = s^2$ is the area of a square of side length s . What does $f(4)$ mean in terms of the square?

Sol $f(4)$ means the area of a square of side length 4 units
 $A = f(4) = (4)^2 = 16$ sq units

2. $A = f(s) = s^2$ is the area of a square of side length s . What does $f(x) = 81$ mean in terms of the square?

Sol $f(x) = 81$ means the area of a square is 81 sq units whose length is " x " units.

3. The circumference, in cm, of a circle whose radius is r cm is given by $C = 2\pi r$. If $C = f(r)$, evaluate and interpret $f(r+1)$.

Sol $C = f(r) = 2\pi r$

$$C = f(r+1) = 2\pi(r+1) = \boxed{2\pi r + 2\pi}$$

$f(r+1)$ means the circumference of a circle in cm, whose radius is 1 more than original radius.

4. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is the practical interpretation of $f(49)$?

Sol $f(49)$ means the average height for females in the U.S. at age of 49 years.

5. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is the practical interpretation of $f(z)+15$?

Sol $f(z)+15$ means the height for females in the U.S. at age of z years is 15 inches taller than the average.

6. Find the y -coordinate of the point on the graph of $y = h(x) = \frac{1}{\sqrt{x+7}}$ whose x -coordinate is -3.

$$y = h(-3) = \frac{1}{\sqrt{-3+7}} = \frac{1}{\sqrt{4}} = \boxed{\frac{1}{2}}$$

7. For $f(x) = x^2 - 4x + 4$, what is $f(x+3)$?

Sol $f(x) = x^2 - 4x + 4$

$$f(x+3) = (x+3)^2 - 4(x+3) + 4$$

$$= x^2 + 6x + 9 - 4x - 12 + 4 = \boxed{x^2 + 2x + 1}$$

Chapter 2 – Section 2.2 Domain and Range

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

Define

Domain POSSIBLE VALUES OF INPUT.Range CORRESPONDING VALUES OBTAINED FROM THE SET OF INPUT VALUES.

Check your understanding:

1. A used car salesman earns a salary (S) of \$100 per week plus a commission of \$45 for each car he sells (c). The lot currently has 85 cars on the lot.

- a. Find the function that represent weekly salary, S , as a function of number of cars sold, c .

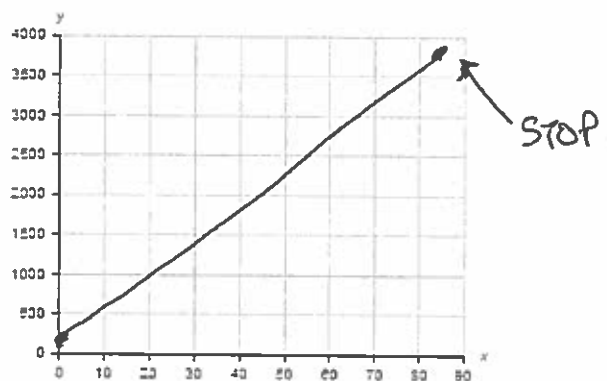
$$S(c) = 100 + 45c$$

- b. What is the domain and the range?

$$\text{DOMAIN: } [0, 85]$$

$$\text{RANGE: } [100, 3925]$$

- c. Graph the function on the axis below



2. Find the domain and range of the function $h(x) = \frac{-3}{x^2 + 4}$

DOMAIN: ALL REALS.

$$y = \frac{-3}{x^2 + 4} \Rightarrow y(x^2 + 4) = -3 \Rightarrow x^2 + 4 = \frac{-3}{y} \Rightarrow x^2 = \frac{-3}{y} - 4 \Rightarrow x = \sqrt{\frac{-3}{y} - 4} \Rightarrow \frac{-3}{y} - 4 \geq 0$$

3. What is the domain and range of $y = h(x) = \frac{2}{\sqrt{x+a}}$, where a is a positive constant?

Sol DOMAIN: $x+a > 0$

$$\boxed{x > -a}$$

RANGE: $y > 0$

4. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is a reasonable domain for $H = f(a)$?

Sol REASONABLE DOMAIN: $[0, 85]$

5. A model rocket is launched from the roof of a building. For height h , in meters, and time t , in seconds, after the rocket is launched, the height of the rocket above the ground is given by

$$h = f(t) = -4.9t^2 + 40t + 16. \text{ Interpret the range of the graph of } f(t).$$

Sol The range of the graph represents the height of the rocket above the ground.

Range: $[-3, 4]$