Pre-Class Problems 7 for Wednesday, February 14

These are the type of problems that you will be working on in class.

You can go to the solution for each problem by clicking on the problem number or letter.

<u>Definition</u> If the function *f* is defined on the interval $[x_1, x_2]$, then the average rate of change of the function on the interval $[x_1, x_2]$ is the slope of the secant line passing through the points $(x_1, f(x_1))$ and $(x_2, f(x_2))$. Thus,

$$\text{Average rate of change} = m_{\text{sec}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

NOTE: $$\text{Average rate of change} = m_{\text{sec}} = \frac{\Delta y}{\Delta x} = \frac{y_1 - y_2}{x_1 - x_2} = \frac{f(x_1) - f(x_2)}{x_1 - x_2}$$

1. If $f(x) = 3x^2 - 5x$, then find the average rate of change of the function *f* on the given intervals.

   a. $[0, 1]$ b. $[0, 2]$ c. $[2, 3]$ d. $[4, 7]$

   e. $[-3, -1]$

2. If $f(x) = 3x^2 - 5x$, then find the average rate of change of the function *f* on the given intervals.

   a. $[4, 4.5]$ b. $[4, 4.1]$ c. $[4, 4.01]$ d. $[4, 4.001]$

3. If $f(x) = 3x^2 - 5x$, then find the average rate of change of the function *f* on the interval $[4, 4 + h]$, where $h > 0$.

4. Use your answer in Problem 3 to verify your answers in Problems 2a, 2b, 2c, and 2d above.

5. Use your answer in Problem 3 to predict the slope of the tangent line to the graph of $f(x) = 3x^2 - 5x$ at the point $(4,\ f(4))$.

Definition The point-slope form for the equation of a line is given by $y - y_1 = m(x - x_1)$, where m is the slope of the line and $(x_1,\ y_1)$ is a point on the line.

Definition The slope-intercept form for the equation of a line is given by $y = mx + b$, where m is the slope of the line and b is the y-coordinate of the y-intercept of the line.

6. Find the point-slope form and the slope-intercept form for the equation of the line if given the following.

   a. passes through $(3,\ 5)$ and $m = 8$

   b. passes through $(-2,\ 7)$ and $m = -\dfrac{3}{4}$

   c. passes through $(7,\ -9)$ and $(4,\ -3)$

   d. passes through $(-1,\ -6)$ and $(5,\ 8)$

   e. passes through $(0,\ 6)$ and $(-2,\ 0)$

   f. passes through $(-11,\ 4)$ and is parallel to the line $y = 5x - 8$

   g. passes through $(-6,\ -12)$ and is parallel to the line $3x - 2y = 18$

h. passes through $(8, 0)$ and is perpendicular to the line $7x + 4y = -3$

7. Sam makes a base salary of $500 per week plus 12% commission on all his sales.

   a. Write a linear function for Sam's weekly salary $S(x)$, where x represents his weekly sales. Find the domain and range of this function.

   b. Find $S(6000)$ and interpret its meaning.

   c. Determine the amount of sales Sam will need to make in order to have a salary of $1500 for one week.

8. A small farmer sells corn. The monthly fixed cost for the business is $2000 and each ear of corn costs $0.15 to produce. The farmer sells the corn for $3.50 a dozen.

   a. Write a linear function $C(x)$ for the cost function to produce x dozen ears of corn per month.

   b. Write a linear function $R(x)$ for the revenue function for selling x dozen ears of corn per month.

   c. Write a linear function $P(x)$ for the profit function for selling x dozen ears of corn per month.

   d. If 3000 dozen ears of corn are sold in a month, how much money will the farmer make or lose?

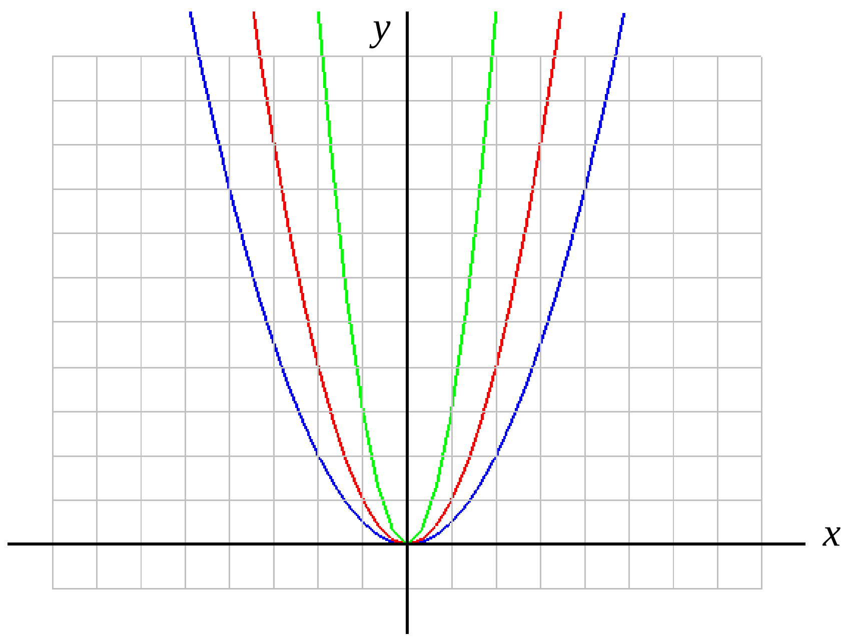
Definition The graph of a function f is the set of points in the *xy*-plane of the form (x, y), where $y = f(x)$ and x is in the domain of *f*. Thus, the graph of the function is the collection of the points $(x, f(x))$ in the *xy*-plane.

COMMENT: A positive real number that is multiplied to the x and/or y variable(s) in an equation involving x and y will change the shape of the graph of the equation but will not shift the graph.

Example The graph of the functions f, g, and h given by $f(x) = x^2$, $g(x) = 3x^2$, and $h(x) = \frac{1}{2}x^2$ respectively are shown below.

NOTE: In order to graph these functions, set $f(x) = y$, set $g(x) = y$, and set $h(x) = y$.

The graph of f is red, the graph of g is green, and the graph of h is blue.



Definition The sketch of the graph of a function is a graph that is drawn from memory usually plotting only one point. If the graph has a horizontal and/or vertical asymptote(s), then we would draw them as dotted lines.

COMMENT: Most of the time in mathematics, we are only interested in a sketch of the graph of a function. In this case, we do not have to worry about the true shape of the graph. However, we will have to worry about horizontal and/or vertical shift(s) of the graph of function.

Example Graph the function g given by $g(x) = \sqrt{x - 4}$.

NOTE: To graph the function g, we set $g(x) = y$ and graph the equation $y = \sqrt{x - 4}$.

The graph of $y = \sqrt{x - 4}$ is the graph of $y = \sqrt{x}$ shifted 4 units to the right.

NOTE: The domain of the function g is $[4, \infty)$ and the range of the function is $[0, \infty)$.

Horizontal Shifts A positive real number that is added or subtracted to the x variable in an equation involving x and y will produce a shift with respect to the x-axis in the xy-plane. Since you can only move to the left or to the right on the x-axis, the shift is to the left or to the right and is called a horizontal shift.

Let c be a positive real number. Then

1. The graph of $y = f(x - c)$ is the graph of $y = f(x)$ shifted c units to the right.

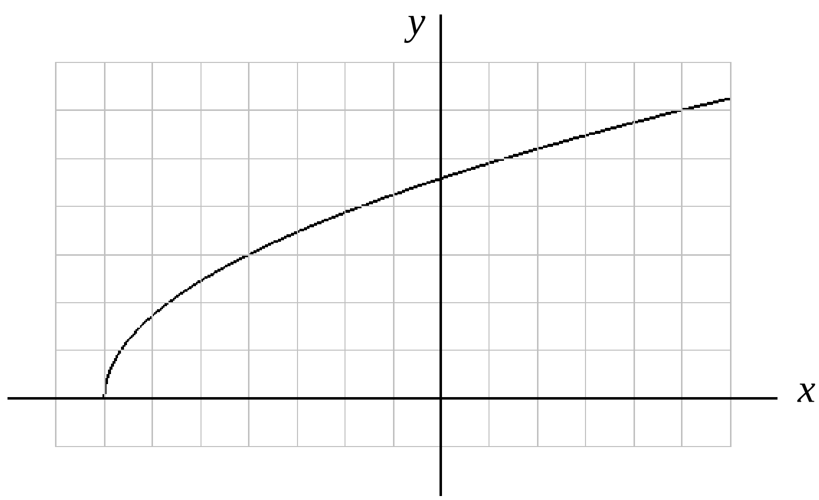
2. The graph of $y = f(x + c)$ is the graph of $y = f(x)$ shifted c units to the left.

In order to identify the amount and direction of a horizontal shift, the coefficient of the x variable must be one.

Let b and c be nonzero real numbers. Given $y = f(bx + c)$, we can factor out the b, which is the coefficient of x, obtaining that $y = f\left[b\left(x + \frac{c}{b}\right)\right]$. The graph of $y = f(bx + c)$, which is the graph of $y = f\left[b\left(x + \frac{c}{b}\right)\right]$, is the graph of $y = f(bx)$ shifted $\frac{c}{b}$ units to the right if $\frac{c}{b} < 0$ or to the left if $\frac{c}{b} > 0$. The shape of the graph of $y = f(bx)$ is similar to the shape of the graph of $y = f(x)$ if $b > 0$ or is similar to the shape of the graph of $y = f(-x)$ if $b < 0$.

Example Graph the function f given by $f(x) = \sqrt{3x + 21}$.

NOTE: To graph the function f, we set $f(x) = y$ and graph the equation $y = \sqrt{3x + 21}$. Since $\sqrt{3x + 21} = \sqrt{3(x + 7)}$, then we graph the equation $y = \sqrt{3(x + 7)}$. The graph of $y = \sqrt{3(x + 7)}$ is the graph of $y = \sqrt{3x}$ shifted 7 units to the left.



NOTE: The domain of the function f is $[-7, \infty)$ and the range of the function is $[0, \infty)$.

Vertical Shifts A positive real number that is added or subtracted to the y variable in an equation involving x and y will produce a shift with respect to the y-axis in the xy-plane. Since you can only move upward or downward on the y-axis, the shift is upward or downward and is called a vertical shift.

Let c be a positive real number. Then

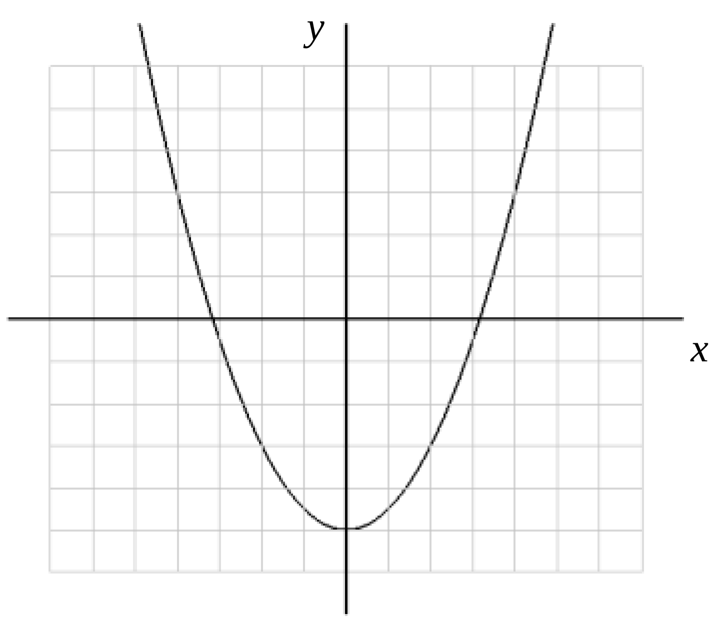
1. The graph of $y - c = f(x)$ is the graph of $y = f(x)$ shifted c units upward.

2. The graph of $y + c = f(x)$ is the graph of $y = f(x)$ shifted c units downward.

In order to identify the amount and direction of a vertical shift, the coefficient of the y variable must be one.

<u>Example</u> Graph the function h given by $h(x) = \frac{1}{2}x^2 - 5$.

NOTE: To graph the function h, we set $h(x) = y$ and graph the equation $y = \frac{1}{2}x^2 - 5$.



The equation $y = \frac{1}{2}x^2 - 5$ is the same as the equation $y + 5 = \frac{1}{2}x^2$. The graph of $y + 5 = \frac{1}{2}x^2$ is the graph of $y = \frac{1}{2}x^2$ shifted 5 units downward.

NOTE: The domain of the function h is the set of all real numbers and the range of the function is $[-5, \infty)$.

Additional problems available in the textbook: Page 209 … 79, 80, 85 – 90 and Example 7 on page 204. Page 222 … 5 – 8, 11 – 14, 17 – 20, 29 – 48, 51 – 56, 59 87, 88 and Examples 1 – 6 starting on page 213.

SOLUTIONS:

1a. $f(x) = 3x^2 - 5x$; $[0, 1]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(1) - f(0)}{1 - 0} = \frac{-2 - 0}{1} = -2$$

$f(1) = 3 - 5 = -2$
$f(0) = 0 - 0 = 0$

Answer: -2

Back to Problem 1.

1b. $f(x) = 3x^2 - 5x$; $[0, 2]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(2) - f(0)}{2 - 0} = \frac{2 - 0}{2} = 1$$

$f(2) = 12 - 10 = 2$
$f(0) = 0 - 0 = 0$

Answer: 1 Back to Problem 1.

1c. $f(x) = 3x^2 - 5x$; $[2, 3]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(3) - f(2)}{3 - 2} = \frac{12 - 2}{1} = 10$$

$f(3) = 27 - 15 = 12$
$f(2) = 12 - 10 = 2$

Answer: 10 Back to Problem 1.

1d. $f(x) = 3x^2 - 5x$; $[4, 7]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(7) - f(4)}{7 - 4} = \frac{112 - 28}{3} = \frac{84}{3} = 28$$

$f(7) = 147 - 35 = 112$
$f(4) = 48 - 20 = 28$

Answer: 28 Back to Problem 1.

1e. $f(x) = 3x^2 - 5x$; $[-3, -1]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(-1) - f(-3)}{-1 - (-3)} = \frac{8 - 42}{2} = \frac{-34}{2} = -17$$

$$f(-1) = 3 + 5 = 8$$
$$f(-3) = 27 + 15 = 42$$

Answer: -17

Back to Problem 1.

2a. $f(x) = 3x^2 - 5x$; $[4, 4.5]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(4.5) - f(4)}{4.5 - 4} = \frac{38.25 - 28}{0.5} = \frac{10.25}{0.5} = 20.5$$

$$f(x) = 3x^2 - 5x = x(3x - 5)$$

$$f(x) = x(3x - 5) \Rightarrow f(4.5) = 4.5(8.5) = 38.25$$
$$f(x) = 3x^2 - 5x \Rightarrow f(4) = 48 - 20 = 28$$

Answer: 20.5

Back to Problem 2.

2b. $f(x) = 3x^2 - 5x$; $[4, 4.1]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(4.1) - f(4)}{4.1 - 4} = \frac{29.93 - 28}{0.1} = \frac{1.93}{0.1} = 19.3$$

$$f(x) = 3x^2 - 5x = x(3x - 5)$$

$$f(x) = x(3x - 5) \Rightarrow f(4.1) = 4.1(7.3) = 29.93$$
$$f(x) = 3x^2 - 5x \Rightarrow f(4) = 48 - 20 = 28$$

Answer: 19.3 Back to Problem 2.

2c. $f(x) = 3x^2 - 5x \ ; [4, \ 4.01]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(4.01) - f(4)}{4.01 - 4} = \frac{28.1903 - 28}{0.01} = \frac{0.1903}{0.01} = 19.03$$

$$f(x) = 3x^2 - 5x = x(3x - 5)$$

$$f(x) = x(3x - 5) \Rightarrow f(4.01) = 4.01(7.03) = 28.1903$$
$$f(x) = 3x^2 - 5x \Rightarrow f(4) = 48 - 20 = 28$$

Answer: 19.03 Back to Problem 2.

2d. $f(x) = 3x^2 - 5x \ ; [4, \ 4.001]$

$$m_{\sec} = \frac{\Delta y}{\Delta x} = \frac{f(4.001) - f(4)}{4.001 - 4} = \frac{28.019003 - 28}{0.001} = \frac{0.019003}{0.001} = 19.003$$

$$f(x) = 3x^2 - 5x = x(3x - 5)$$

$f(x) = x(3x - 5) \Rightarrow f(4.001) = 4.001(7.003) = 28.019003$
$f(x) = 3x^2 - 5x \Rightarrow f(4) = 48 - 20 = 28$

Answer: 19.003 Back to Problem 2.

3. $f(x) = 3x^2 - 5x$; $[4, 4 + h]$

$$m_{\text{sec}} = \frac{\Delta y}{\Delta x} = \frac{f(4 + h) - f(4)}{4 + h - 4} = \frac{28 + 19h + 3h^2 - 28}{h} = \frac{19h + 3h^2}{h} =$$

$$\frac{h(19 + 3h)}{h} = 19 + 3h$$

$f(4 + h) = 3(4 + h)^2 - 5(4 + h) = 3(16 + 8h + h^2) - 20 - 5h =$

$48 + 24h + 3h^2 - 20 - 5h = 28 + 19h + 3h^2$

$f(4) = 48 - 20 = 28$

Answer: $19 + 3h$ Back to Problem 3.

4a. In Problem 3, we found that $m_{\text{sec}} = 19 + 3h$.

In Problem 2a, our interval was $[4, 4.5]$ and we calculated that $m_{\text{sec}} = 20.5$.

NOTE: In order for $[4,\ 4 + h] = [4,\ 4.5]$, $h = 0.5$.

Thus, if $h = 0.5$ and $m_{\sec} = 19 + 3h$, then $m_{\sec} = 19 + 1.5 = 20.5$.

The two answers agree. Back to Problem 4.

4b. In Problem 3, we found that $m_{\sec} = 19 + 3h$.

In Problem 2b, our interval was $[4,\ 4.1]$ and we calculated that $m_{\sec} = 19.3$.

NOTE: In order for $[4,\ 4 + h] = [4,\ 4.1]$, $h = 0.1$.

Thus, if $h = 0.1$ and $m_{\sec} = 19 + 3h$, then $m_{\sec} = 19 + 0.3 = 19.3$.

The two answers agree. Back to Problem 4.

4c. In Problem 3, we found that $m_{\sec} = 19 + 3h$.

In Problem 2c, our interval was $[4,\ 4.01]$ and we calculated that $m_{\sec} = 19.03$.

NOTE: In order for $[4,\ 4 + h] = [4,\ 4.01]$, $h = 0.01$.

Thus, if $h = 0.01$ and $m_{\sec} = 19 + 3h$, then $m_{\sec} = 19 + 0.03 = 19.03$.

The two answers agree. Back to Problem 4.

4d. In Problem 3, we found that $m_{\text{sec}} = 19 + 3h$.

In Problem 2d, our interval was $[4,\ 4.001]$ and we calculated that $m_{\text{sec}} = 19.003$.

NOTE: In order for $[4,\ 4 + h] = [4,\ 4.001]$, $h = 0.001$.

Thus, if $h = 0.001$ and $m_{\text{sec}} = 19 + 3h$, then $m_{\text{sec}} = 19 + 0.003 = 19.003$.

The two answers agree. Back to Problem 4.

5. In Problem 3, we found that $m_{\text{sec}} = 19 + 3h$. Using this information, we can create the following table.

h	m_{sec}
0.1	19.3
0.01	19.03
0.001	19.003
0.0001	19.0003
0.00001	19.00003
0.00001	19.00003
0.000001	19.000003
0.0000001	19.0000003
0.00000001	19.00000003
0.000000001	19.000000003
0.0000000001	19.0000000003
0.00000000001	19.00000000003

From the table, it appears that $m_{\tan} = 19$.

In calculus, you will verify this statement using the concept of a limit. The slope of a tangent line is an **instantaneous** rate of change. It measures how fast the *y*-coordinates are changing with respect to how fast the *x*-coordinates are changing at one point on the graph of the function.

Since $m_{\tan} = 19$ for the function $f(x) = 3x^2 - 5x$ at the point $(4, f(4))$, then this is how fast the *y*-coordinates are changing with respect to how fast the *x*-coordinates are changing at this one point of $(4, 28)$ on the graph of *f*.

Answer: 19 Back to Problem 5.

6a. passes through $(3, 5)$ and $m = 8$

$$y - y_1 = m(x - x_1) \Rightarrow y - 5 = 8(x - 3)$$

NOTE: In order to get the slope-intercept form of the line, solve for *y* in the equation $y - 5 = 8(x - 3)$.

$$y - 5 = 8(x - 3) \Rightarrow y - 5 = 8x - 24 \Rightarrow y = 8x - 19$$

Answer: Point-Slope: $y - 5 = 8(x - 3)$

Back to Problem 6.

Slope-Intercept: $y = 8x - 19$

6b. passes through $(-2, 7)$ and $m = -\dfrac{3}{4}$

$$y - y_1 = m(x - x_1) \Rightarrow y - 7 = -\frac{3}{4}(x + 2)$$

NOTE: In order to get the slope-intercept form of the line, solve for *y* in the equation $y - 7 = -\frac{3}{4}(x + 2)$.

$$y - 7 = -\frac{3}{4}(x + 2) \Rightarrow y - 7 = -\frac{3}{4}x - \frac{3}{2} \Rightarrow y = -\frac{3}{4}x + \frac{11}{2}$$

NOTE: $-\frac{3}{2} + 7 = -\frac{3}{2} + \frac{14}{2} = \frac{11}{2}$

Answer: Point-Slope: $y - 7 = -\frac{3}{4}(x + 2)$

Back to Problem 6.

Slope-Intercept: $y = -\frac{3}{4}x + \frac{11}{2}$

6c. passes through $(7, -9)$ and $(4, -3)$

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-9 + 3}{7 - 4} = \frac{-6}{3} = -2$$

Using the point $(4, -3)$: $y - y_1 = m(x - x_1) \Rightarrow y + 3 = -2(x - 4)$

Using the point $(7, -9)$: $y - y_1 = m(x - x_1) \Rightarrow y + 9 = -2(x - 7)$

Using $y + 3 = -2(x - 4)$:
$y + 3 = -2(x - 4) \Rightarrow y + 3 = -2x + 8 \Rightarrow y = -2x + 5$

Using $y + 9 = -2(x - 7)$:
$y + 9 = -2(x - 7) \Rightarrow y + 9 = -2x + 14 \Rightarrow y = -2x + 5$

Answer: Point-Slope: $y + 3 = -2(x - 4)$ **or** $y + 9 = -2(x - 7)$

Slope-Intercept: $y = -3x - 5$ Back to Problem 6.

6d. passes through $(-1, -6)$ and $(5, 8)$

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-6 - 8}{-1 - 5} = \frac{-14}{-6} = \frac{7}{3}$$

Using the point $(-1, -6)$: $y - y_1 = m(x - x_1) \Rightarrow y + 6 = \frac{7}{3}(x + 1)$

Using the point $(5, 8)$: $y - y_1 = m(x - x_1) \Rightarrow y - 8 = \frac{7}{3}(x - 5)$

Using $y + 6 = \frac{7}{3}(x + 1)$:

$$y + 6 = \frac{7}{3}(x + 1) \Rightarrow y + 6 = \frac{7}{3}x + \frac{7}{3} \Rightarrow y = \frac{7}{3}x - \frac{11}{3}$$

NOTE: $\frac{7}{3} - 6 = \frac{7}{3} - \frac{18}{3} = -\frac{11}{3}$

Using $y - 8 = \frac{7}{3}(x - 5)$:

$y - 8 = \frac{7}{3}(x - 5) \Rightarrow y - 8 = \frac{7}{3}x - \frac{35}{3} \Rightarrow y = \frac{7}{3}x - \frac{11}{3}$

NOTE: $-\frac{35}{3} + 8 = -\frac{35}{3} + \frac{24}{3} = -\frac{11}{3}$

Answer: Point-Slope: $y + 6 = \frac{7}{3}(x + 1)$ **or** $y - 8 = \frac{7}{3}(x - 5)$

Slope-Intercept: $y = \frac{7}{3}x - \frac{11}{3}$

Back to Problem 6.

6e. passes through $(0, 6)$ and $(-2, 0)$

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{6 - 0}{0 + 2} = \frac{6}{2} = 3$$

Using the point $(0, 6)$: $y - y_1 = m(x - x_1) \Rightarrow y - 6 = 3x$

Using the point $(-2, 0)$: $y - y_1 = m(x - x_1) \Rightarrow y = 3(x + 2)$

Using $y - 6 = 3x$: $y - 6 = 3x \Rightarrow y = 3x + 6$

Using $y = 3(x + 2)$: $y = 3(x + 2) \Rightarrow y = 3x + 6$

Answer: Point-Slope: $y - 6 = 3x$ **or** $y = 3(x + 2)$

Slope-Intercept: $y = 3x + 6$ Back to Problem 6.

6f. passes through $(-11,\ 4)$ and is parallel to the line $y = 5x - 8$

The slope of the line $y = 5x - 8$ is 5. Parallel lines have the same slope.

So, we have that the line passes through $(-11,\ 4)$ and $m = 5$.

$$y - y_1 = m(x - x_1) \Rightarrow y - 4 = 5(x + 11)$$

$$y - 4 = 5(x + 11) \Rightarrow y - 4 = 5x + 55 \Rightarrow y = 5x + 59$$

Answer: Point-Slope: $y - 4 = 5(x + 11)$

Back to Problem 6.

Slope-Intercept: $y = 5x + 59$

6g. passes through $(-6,\ -12)$ and is parallel to the line $3x - 2y = 18$

$$3x - 2y = 18 \Rightarrow -2y = 3x + 18 \Rightarrow y = -\frac{3}{2}x - 9$$

The slope of the line $y = -\frac{3}{2}x - 9$ is $-\frac{3}{2}$. Parallel lines have the same slope.

So, we have that the line passes through $(-6, -12)$ and $m = -\frac{3}{2}$.

$$y - y_1 = m(x - x_1) \Rightarrow y + 12 = -\frac{3}{2}(x + 6)$$

$$y + 12 = -\frac{3}{2}(x + 6) \Rightarrow y + 12 = -\frac{3}{2}x - 9 \Rightarrow y = -\frac{3}{2}x - 21$$

Answer: Point-Slope: $y + 12 = -\frac{3}{2}(x + 6)$

Slope-Intercept: $y = -\frac{3}{2}x - 21$

Back to Problem 6.

6h. passes through $(8, 0)$ and is perpendicular to the line $7x + 4y = -3$

$$7x + 4y = -3 \Rightarrow 4y = -7x - 3 \Rightarrow y = -\frac{7}{4}x - \frac{3}{4}$$

The slope of the line $y = -\frac{7}{4}x - \frac{3}{4}$ is $-\frac{7}{4}$. The product of the slopes of perpendicular lines is -1. Thus, the slope of the line perpendicular to the line $y = -\frac{7}{4}x - \frac{3}{4}$ is $\frac{4}{7}$.

So, we have that the line passes through $(8, 0)$ and $m = \frac{4}{7}$.

$$y - y_1 = m(x - x_1) \Rightarrow y = \frac{4}{7}(x - 8)$$

$$y = \frac{4}{7}(x - 8) \Rightarrow y = \frac{4}{7}x - \frac{32}{7}$$

Answer: Point-Slope: $y = \frac{4}{7}(x - 8)$

Back to Problem 6.

Slope-Intercept: $y = \frac{4}{7}x - \frac{32}{7}$

7a. $S(x) = 0.12x + 500$

Back to Problem 7.

Domain of S: $[0, \infty)$

Range of S: $[500, \infty)$

7b. $S(x) = 0.12x + 500$

Back to Problem 7.

$$S(6000) = 0.12(6000) + 500 = 720 + 500 = 1220$$

Answer: 1220

$S(6000) = 1220$ means that Sam will make $1220 in salary for the week if he has sales of $6000.

7c. Solve the equation $S(x) = 1500$

Back to Problem 7.

$$S(x) = 1500 \Rightarrow 0.12x + 500 = 1500 \Rightarrow 0.12x = 1000 \Rightarrow x = \frac{1000}{0.12} \Rightarrow$$

$$x \approx 8333.33$$

Answer: Sam will need to have sales of $8333.33 in order to make a salary of $1500 for one week.

8a. Since it costs $0.15 to produce one ear of corn, it will cost $1.80 to produce a dozen ears of corn.

Answer: $C(x) = 1.8x + 2000$ Back to Problem 8.

8b. **Answer:** $R(x) = 3.5x$ Back to Problem 8.

8c. Since profits are obtained by subtracting cost from revenue, then

$$P(x) = R(x) - C(x) = 3.5x - (1.8x + 2000) = 3.5x - 1.8x - 2000 =$$

$$1.7x - 2000$$

Answer: $P(x) = 1.7x - 2000$ Back to Problem 8.

8d. $P(x) = 1.7x - 2000 \Rightarrow P(3000) = 1.7(3000) - 2000 = 5100 - 2000 = 3100$

Answer: The farmer will make $3100 for the month.