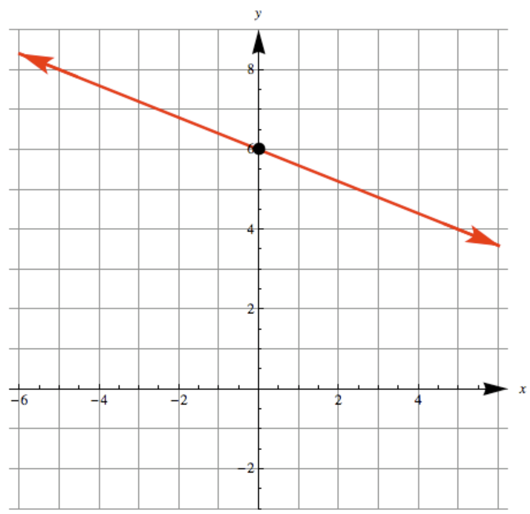
PRECALCULUS PROBLEM SESSION #2 SOLUTIONS

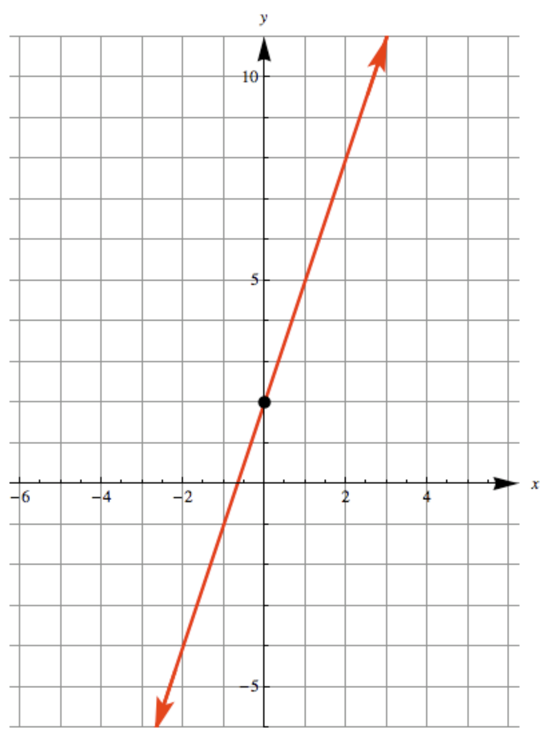
Linear Functions and Slope

1. The slope, m, is equal to 2. Since $m = 2$, the line through the points rises from left to right.

2. a) $y = 8x - 33$
   b) $y = 2x - 1$

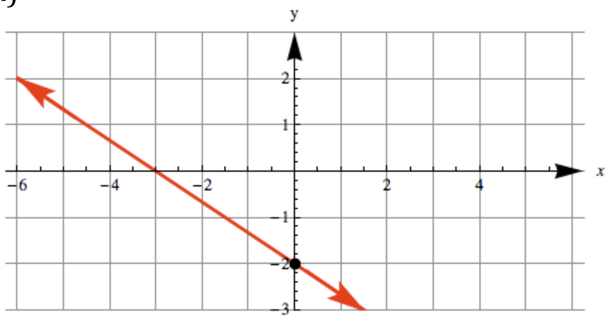


3. a) $m = -2/5$, $(0, b) = (0, 6)$

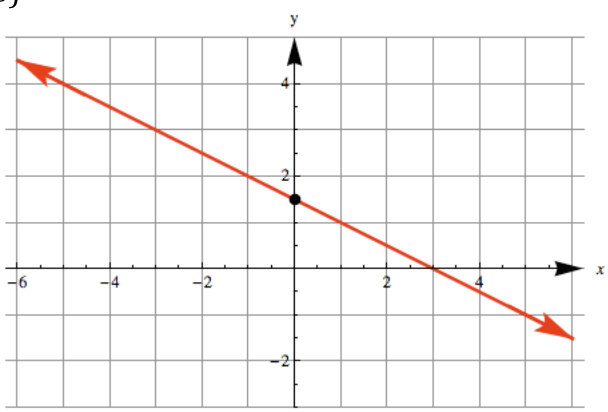


   b) $m = 3$, $(0, b) = (0, 2)$

4. a) $y = -\frac{2}{3}x - 2$; $m = -\frac{2}{3}$ and $(0, b) = (0, -2)$



b) $y = -\frac{1}{2}x + \frac{3}{2}$; $m = -\frac{1}{2}$ and $(0, b) = \left(0, \frac{3}{2}\right)$



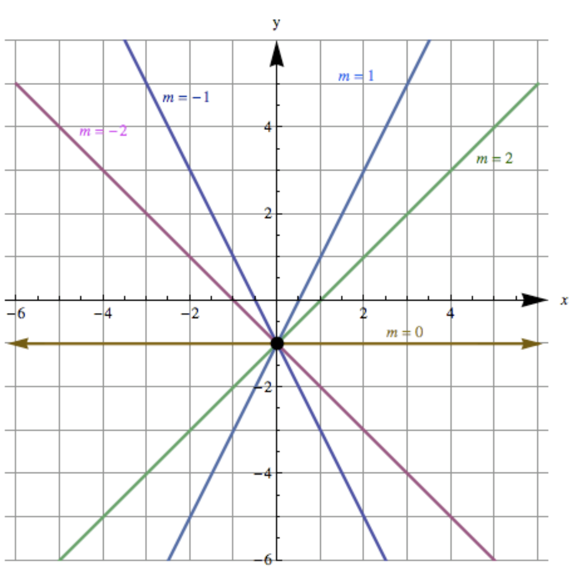
5. a. If $A \neq 0, B \neq 0$, then there is one *x*-intercept and one *y*-intercept, although they might coincide.

b. If $A = 0, B \neq 0$, then there is one *y*-intercept and no *x*-intercepts, except when $C = 0$.

c. If $A \neq 0, B = 0$, then there is one *x*-intercept and no *y*-intercepts, except when $C = 0$.

6. If $m = 0$ and $b \neq 0$, then *f(x)* has no zeros. If $m = 0$ and $b = 0$, then *f(x)* has infinitely many zeros

7.



8. $b_2 > b_1 > b_4 > b_3$

PRECALCULUS PROBLEM SESSION #2 SOLUTIONS

More on Slope

1. $Ay - Bx = 0$

2. a) Point-slope form: y – 3 = x + 1
   General form: -x + y – 4 = 0

   b) Point-slope form: y – 7 = -5(x + 2)
   General form: y – 7 = -5x - 10

   c) Point-slope form: y + 9 = 7(x – 5)
   General form: 7x – y – 44 = 0

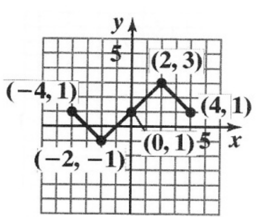
3. $y = mx$ and $y = -\frac{1}{m}x$

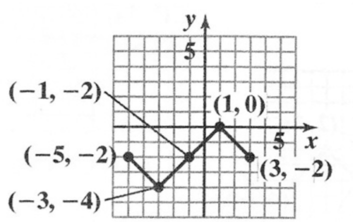
4. a) 7 b) $\frac{1}{7}$

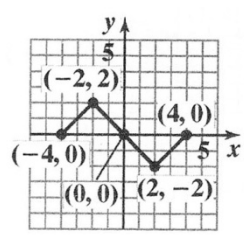
5. i) 2 ii) 2.5 iii) 2.9

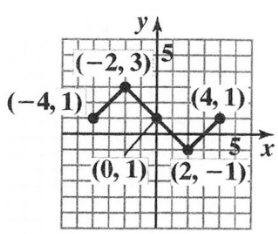
6. $P(x) = 1.3x + 23$

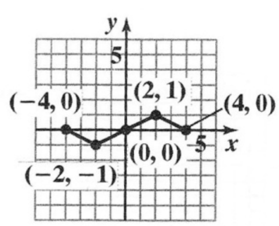
<u>Function Transformations</u>

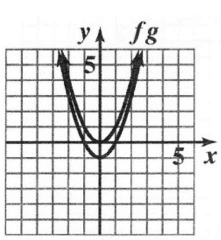
1. a)


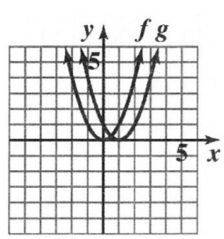
b)


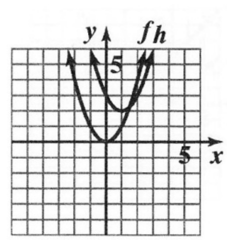
c)


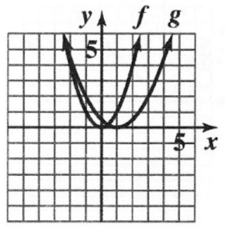
d)


e)


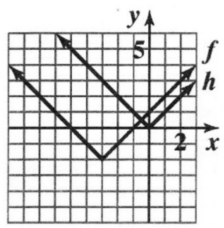
2. a)


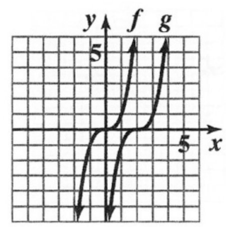
b)


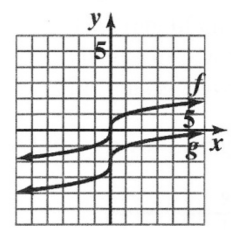
c)


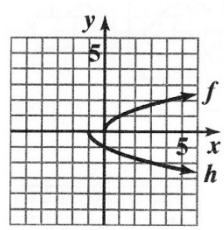


d)

3. 

4. 

5. 

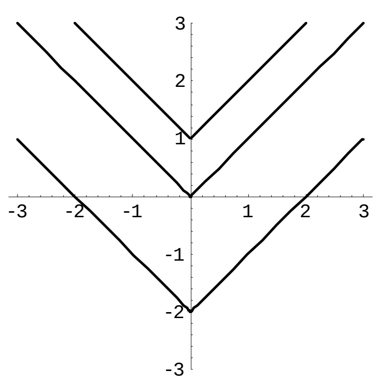
6. 

7. a) i b) i

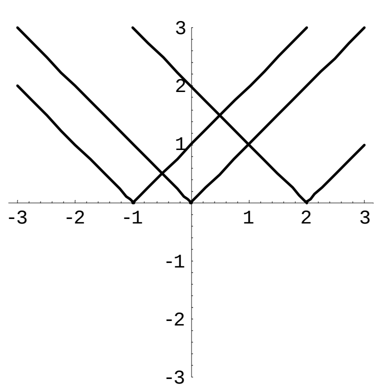
8. $y = -(x-2)^2 + 4$

9. y-axis

10. a) $(a, -b)$ b) $(-a, b)$ c) $(-a, -b)$

11. 1) 

The graph of $y = f(x) + k$ is the graph of $y = f(x)$ vertically shifted k units up if $k \geq 0$ or k units down if $k < 0$.

2) 

The graph of $y = f(x + h)$ is the graph of $y = f(x)$ horizontally shifted h units to the left if $h \geq 0$ or h units to the right if $h < 0$.

PRECALCULUS PROBLEM SESSION #2 SOLUTIONS

Combinations of Functions and Composite Functions

1. $(f+g)(x) = 2x - 1 - \frac{6}{x-1},\ x \neq 1;$ $(f-g)(x) = \frac{6}{x-1} - 1,\ x \neq 1;$

$(fg)(x) = x^2 - x - 6,\ x \neq 1;$ $(\frac{f}{g})(x) = \frac{x^2 - 1}{x^2 - x - 6},\ x \neq 3, x \neq -2, x \neq 1$

$(f+g)(x) = 6x^2 - 2$
$(f-g)(x) = 6x^2 - 2x$
$(fg)(x) = (6x^2 - x - 1)(x-1) = 6x^3 - 7x^2 + 1$
$\left(\frac{f}{g}\right)(x) = \frac{6x^2 - x - 1}{x-1}$

3.
(a) The expression under the radical must not be negative.
$x + 2 \geq 0$
$x \geq -2$
Domain: $[-2, \infty)$

(b) The function contains neither division nor an even root.The domain = $(-\infty, \infty)$

(c) The denominator equals zero when x = -5. This value must be excluded from the domain.
Domain: $(-\infty, -5) \cup (-5, \infty)$.

(d) The expression under the radical must be positive.
$x + 2 > 0$
$x > -2$
Domain: $(-2, \infty)$

4. $fog(x) = f\left(\frac{1}{x}\right) = \frac{5}{\left(\frac{1}{x}\right) - 3} = \frac{5x}{1 - 3x}$

We must exclude ( ) because it is excluded from g. We must exclude $\frac{1}{3}$ because it causes the denominator of fog to be 0. Domain: $(-\infty, 0) \cup (0, \frac{1}{3}) \cup (\frac{1}{3}, \infty)$

5. $(f \circ g)(x) = \sqrt{9 - x^2} - 1,\ -3 \leq x \leq 3;\ (g \circ f)(x) = \sqrt{8 + 2x - x^2},\ -2 \leq x \leq 4$