1. $\frac{2x-1}{3}-\frac{x-5}{6}=\frac{x-3}{4}$ Solve for x:

$12\left(\frac{2x-1}{3}-\frac{x-5}{6}\right)=12\left(\frac{x-3}{4}\right)$

$8x-4-2x+10=3x-9$

$6x+6=3x-9$

$3x=-15$

x_2-5

2. $2(1-4x)+3(5-2x)<7x$ Solve for x:

$2-8x+15-6x<7x$

$-14x+17<7x$

$-21x<-17$

$x>\frac{17}{21}$

3. I, II, IV are functions.

4. The slope of $3x+2y=6$ is $m=-\frac{3}{2}$.

A perpendicular line has slope $m=\frac{2}{3}$.

The equation of the line with slope $m=\frac{2}{3}$ passing through the point $(3,-2)$ in slope point form is: $y+2=\frac{2}{3}(x-3)$; in slope intercept form is: $y=\frac{2}{3}x-4$

5. $f(x) < g(x)$ in the interval $(-\infty, 6)$

6. $\frac{2}{x+p} = \frac{3}{q}$ Solve for x:

$3(x+p) = 2q$

$3x + 3p = 2q$

$3x = 2q - 3p$

$x = \frac{2q-3p}{3}$

7. Let the width and the length $= x+3$

The perimeter $P = 2x + 2(x+3)$

$P = 2x + 2x + 6$

$P = 4x + 6$

$P = 26;$

$26 = 4x + 6$

$20 = 4x$

$x = 5$

the length is 8 ft.

8. I, II, and III are incorrect.

9. Shifting $f(x)$ to the left 2 units and 3 units downwards.

10. $f(x) = 3x + 2$ and $g(x) = 5x$

$(f \circ g)(x) = f[g(x)] = f[5x] = 3(5x) + 2 = 15x + 2$

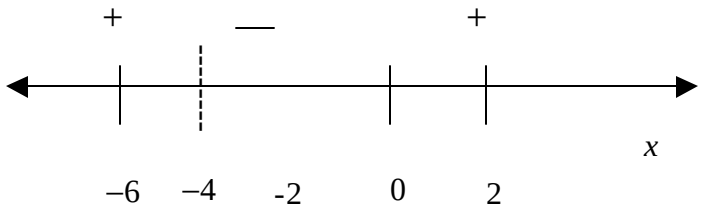
11. $h(f(g(7)) = h(f(6) = h(9) = 0$

12. $f(x) = x^2 - 5x + 3$

$$\begin{aligned}\frac{f(x+h) - f(x)}{h} &= \frac{(x+h)^2 - 5(x+h) + 3 - (x^2 - 5x + 3)}{h} \\ &= \frac{x^2 + 2hx + h^2 - 5x - 5h + 3 - x^2 + 5x - 3}{h} \\ &= \frac{2hx + h^2 - 5h}{h} \\ &= 2x + h - 5\end{aligned}$$

13. Solve the inequality

$$x^2 + 6x + 8 > 0$$
$$(x+2)(x+4) > 0$$



$$(-\infty, -4) \cup (-2, \infty)$$

14. $a > 0$ implies that the graph of $f(x)$ is concave up

$b^2 - 4\,ac < 0$ implies that the graph of $f(x)$ does not intersect the $x-axis$.

Name:_____ Section:_____

Instructor:_____

The following questions are free response. Please show all work in order to receive credit. If you use a graphing calculator, you must sketch the graph and explain your answer. 10 points each.

15. At $68°$ F, a certain species of cricket chirps 24 times per minute. At $40°$ F, the same cricket chirps 86 times per minute.

a. Express the number of chirps, y, as a function of temperature.

Let $x = Fahrenheit\ \ temperature$, the orderd pairs are: $(68\ ,\ 24)$ *and* $(40\ ,\ 86)$

The slope $m = \dfrac{86-24}{40-68} = -\dfrac{31}{14}$;

The equation in point slope form is: $y - 86 = -\dfrac{31}{14}(x-40)$

The equation in slope intercept form is: $y = -\dfrac{31}{14}x + \dfrac{1222}{7}$

b. If the temperature is $60°$ F, how many times will the cricket chirp per minute?

$y = -\dfrac{31}{14}(60) + \dfrac{1222}{7} \approx 41.71$. The cricket will chirp 42 times per minute.

c. If you count the number of cricket chirps in one-half minute and hear 40 chirps, what is the temperature?

If you count 40 chirps in half minute, the cricket will chirp 80 times in one minute.

$80 = -\dfrac{31}{14}x + \dfrac{1222}{7}$, solve for x: $x \approx 42.71$; the temperature is $42.71^{\circ}\ F$

16. Find the equation of the quadratic function with vertex (5, 6) that goes through $(1, -6)$.

$y = a(x-h)^2 + k; \quad h = 5,\ k = 6 \ \ and \ \ \ x = 1,\ y = -6$

$-6 = a(1-5)^2 + 6;\ solve\ for\ a:\ a = -\frac{3}{4}$

The equation of the quadratic function is: $y = -\frac{3}{4}(x-5)^2 + 6$

The equation of the quadratic function in standard form is: $y = -\frac{3}{4}x^2 + \frac{15}{2}x - \frac{51}{4}$

17. Graph the following function:

$$f(x) = \begin{cases} 2x+1 \text{ if } x < -1 \\ x+2 \text{ if } x \geq -1 \end{cases}$$