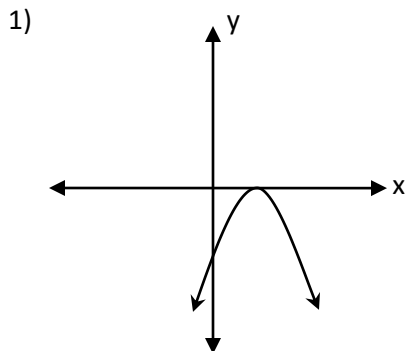
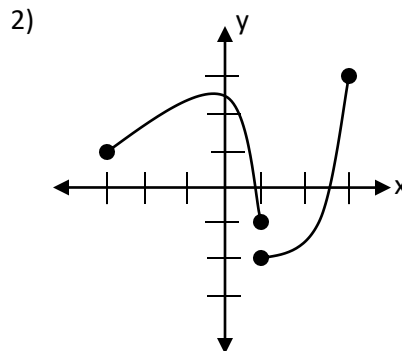


Determine whether each graph is a function, then determine the domain and range for each.



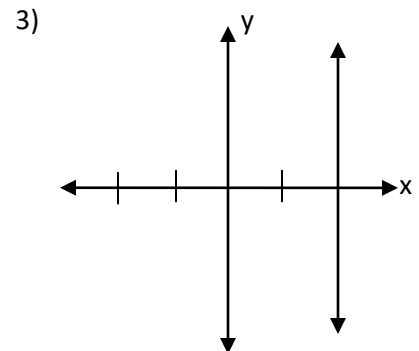
Domain = {all real numbers}

Range =  $\{y \leq 0\}$



Domain =  $\{-3 \leq x \leq 3\}$

Range =  $\{-2 \leq y \leq 3\}$



Domain =  $\{x = 2\}$

Range = {all real numbers}

Given a function in equation form, determine the domain and range.

4)  $f(x) = -2x^2 - 20x - 37$

$$x = \frac{-b}{2a} = \frac{20}{2(-2)} = \frac{20}{-4} = -5$$

$$y = -2(-5)^2 - 20(-5) - 37$$

$$y = -2(25) + 100 - 37 = 13$$

Domain = {all real numbers}

Range =  $\{y \leq 13\}$

5)  $f(x) = \frac{3x+1}{x^2+11x+30}$

$$(x+5)(x+6)$$

$$x \neq -5, -6$$

Domain = {real no.s,  $x \neq -5, -6$ }

Range = {all real numbers}

6)  $f(x) = \sqrt{2x-22}$

$$2x - 22 \geq 0$$

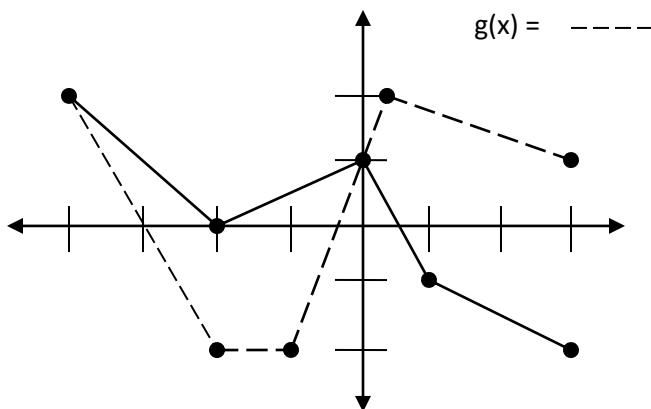
$$2x \geq 22$$

$$x \geq 11 \quad V(11,0)$$

Domain =  $\{x \geq 11\}$

Range =  $\{y \geq 0\}$

Use the graph below to answer the problems in the text box.



- 7)  $f(-4) + g(-4) = 2 + 2 = 4$
- 8) For what values of  $x$  is  $f(x) - g(x)$  negative?  
 $\{0 < x < 3\}$
- 9) What is the maximum value for  $g(x) - f(x)$ ?  $@g(3) - f(3) = 1 - (-2) = 3$
- 10)  $g(0) - f(1) + g(-2) = 1 - (-1) + (-2) = 0$
- 11) For what values of  $x$  does  $f(x) - g(x) = 0$ ?  
 $f(-4) - g(-4) = 0$  and  $f(0) - g(0) = 0$   $\{-4, 0\}$

For the remaining problems, let  $f(x) = x - 1$ ,  $g(x) = 2x^2 + 7$ ,  $h(x) = x^2 + x - 2$

12)  $(f + g + h)(x)$

$$\begin{aligned} &= (x - 1) + (2x^2 + 7) + (x^2 + x - 2) \\ &= x - 1 + 2x^2 + 7 + x^2 + x - 2 \\ &= 3x^2 + 2x + 4 \end{aligned}$$

13)  $h(-5)$

$$\begin{aligned} &= (-5)^2 - 5 - 2 \\ &= 25 - 5 - 2 \\ &= 18 \end{aligned}$$

14)  $(f \bullet g)(x)$

$$\begin{aligned} &= (x - 1)(2x^2 + 7) \\ &= 2x^3 - 2x^2 + 7x - 7 \end{aligned}$$

15)  $h(f(x))$

$$\begin{aligned} &= (x - 1)^2 + (x - 1) - 2 \\ &= (x - 1)(x - 1) + (x - 1) - 2 \\ &= x^2 - x - x + 1 + x - 1 - 2 \\ &= x^2 - x - 2 \end{aligned}$$

16)  $(g - h)(x)$

$$\begin{aligned} &= (2x^2 + 7) - (x^2 + x - 2) \\ &= 2x^2 + 7 - x^2 - x - 2 \\ &= x^2 - x + 9 \end{aligned}$$

17)  $\left(\frac{h}{f}\right)(x)$

$$\begin{aligned} &= \frac{x^2 + x - 2}{x - 1} \\ &= \frac{(x + 2)(x - 1)}{(x - 1)} \\ &= x + 2 \end{aligned}$$

18)  $g(f(h(1)))$

$$\begin{aligned} h(1) &= 1 + 1 - 2 = 0 \\ f(0) &= 0 - 1 = -1 \\ g(-1) &= 2(-1)^2 + 7 = 9 \\ g(f(h(1))) &= 9 \end{aligned}$$

19)  $f(g(x))$

$$\begin{aligned} &= (2x^2 + 7) - 1 \\ &= 2x^2 + 7 - 1 \\ &= 2x^2 + 6 \end{aligned}$$

20)  $h(g(f(-1)))$

$$\begin{aligned} f(-1) &= -1 - 1 = -2 \\ g(-2) &= 2(-2)^2 + 7 = 15 \\ h(15) &= 15^2 + 15 - 2 = 238 \\ h(g(f(-1))) &= 238 \end{aligned}$$

domain: all the x-values for any given function

21) Define the terms "domain" and "range".

range: all the y-values for any given function

22) The notation  $(f \circ g)(x)$  means the same as  $f(g(x))$  or f "of" g "of" x