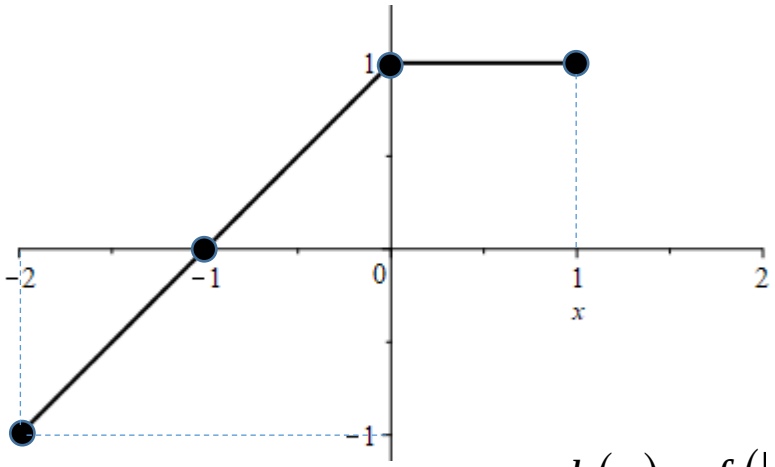
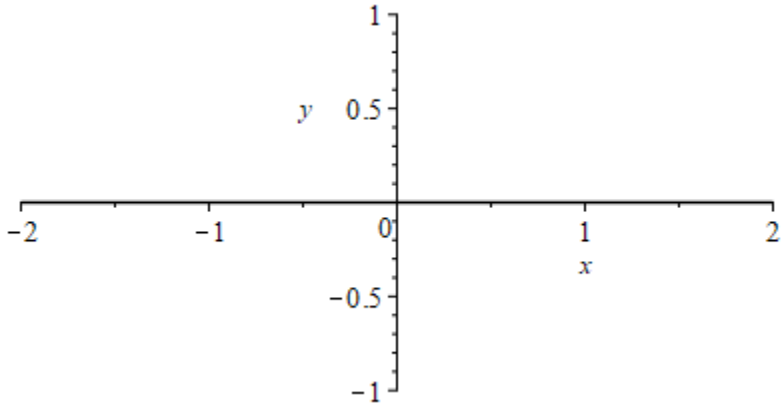
More Transformations:

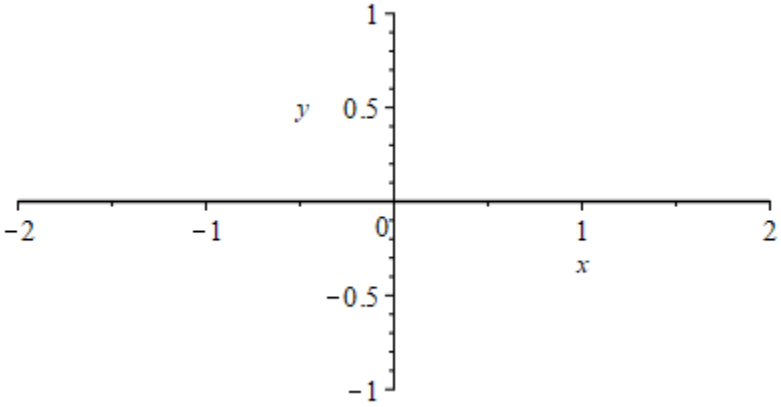
f



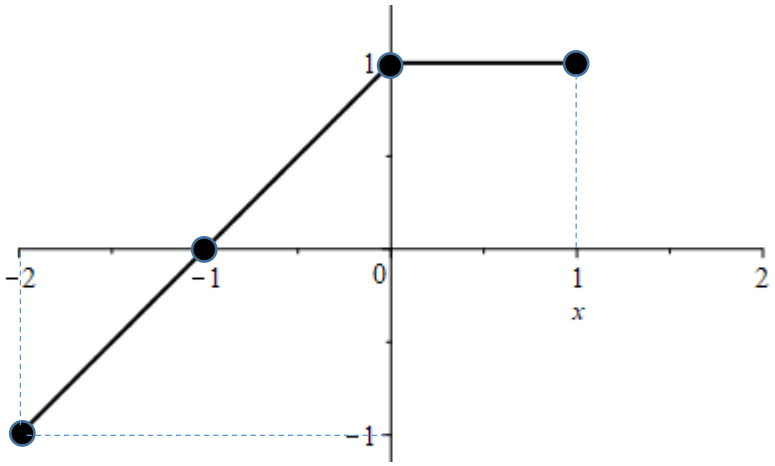
$g(x) = |f(x)|$



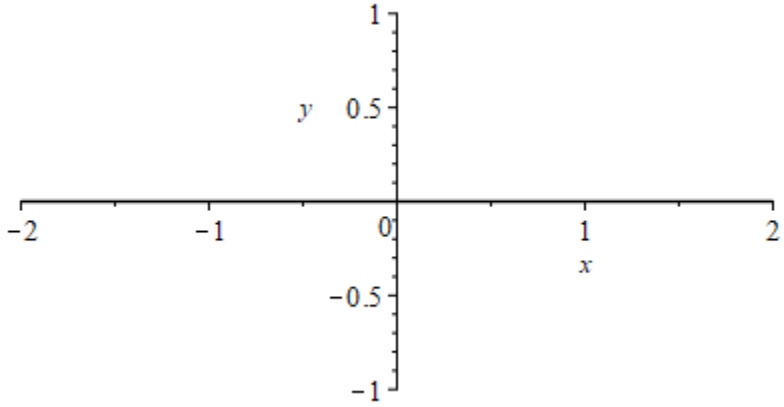
$h(x) = f(|x|)$

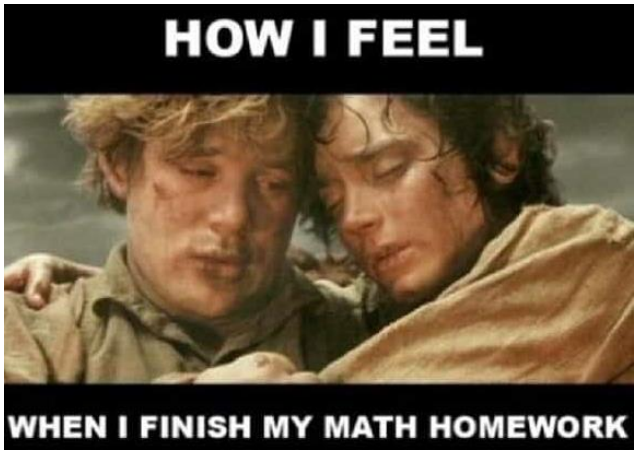


f


1
−2
−1
0
1
2
x
−1

$g(x) = f(-|x|)$

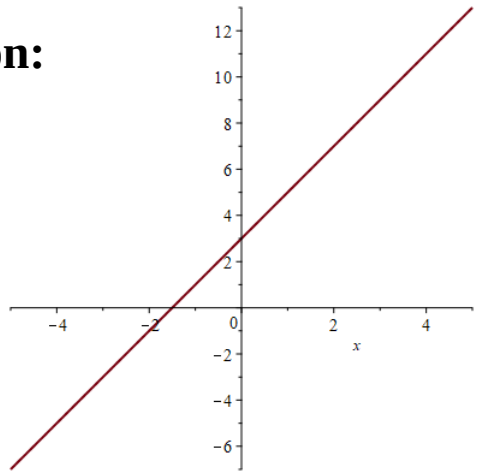

1
y
0.5
−2
−1
0
1
2
x
−0.5
−1

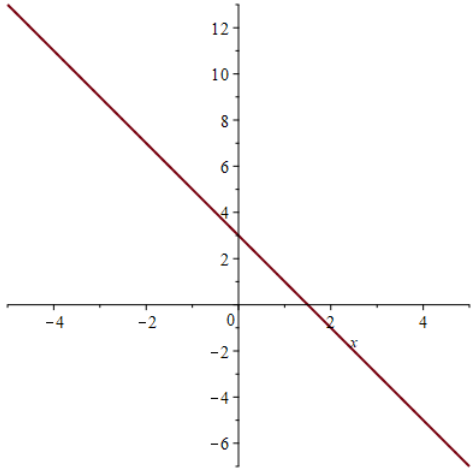

HOW I FEEL
WHEN I FINISH MY MATH HOMEWORK

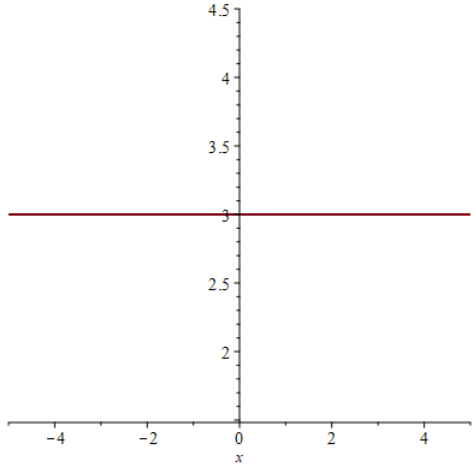
Library of Common Functions:

1. Linear Function:

$f(x) = mx + b$

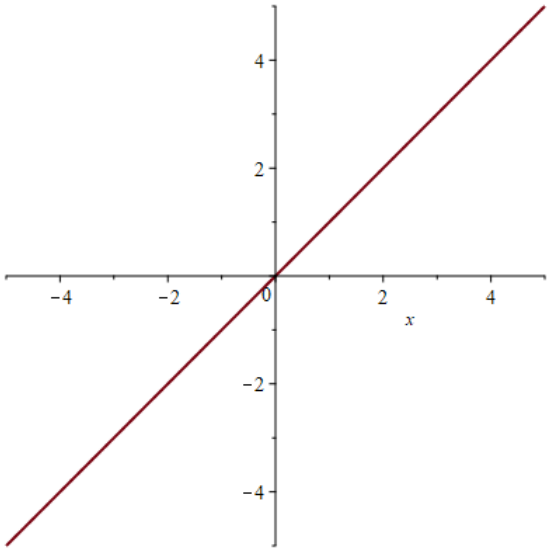


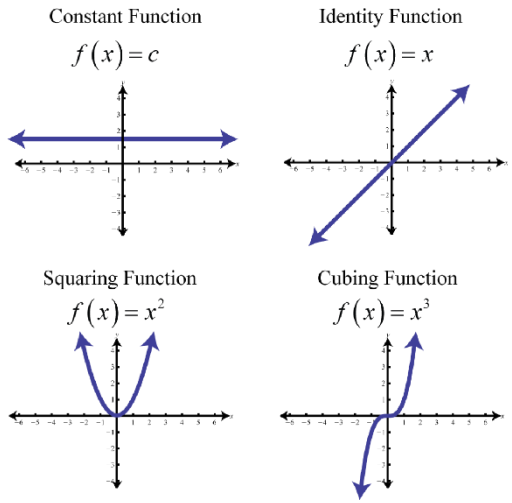




2. Identity Function:

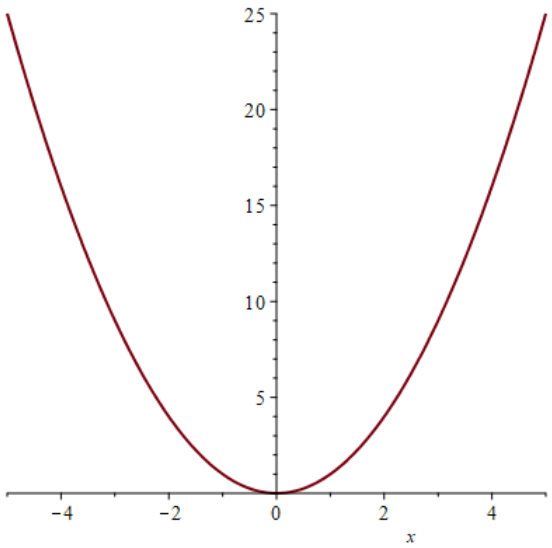
$f(x) = x$





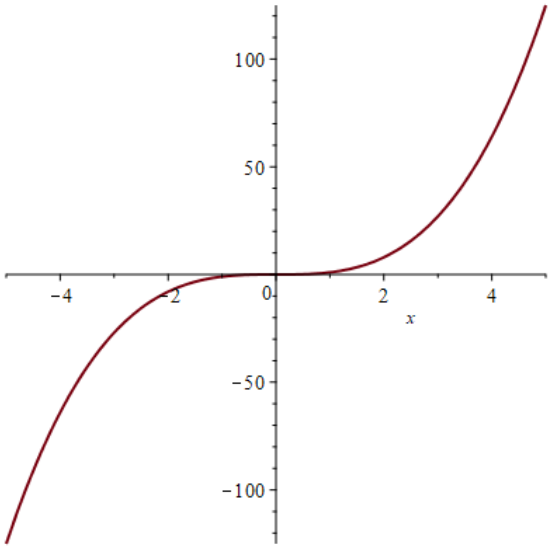
3. Squaring Function:

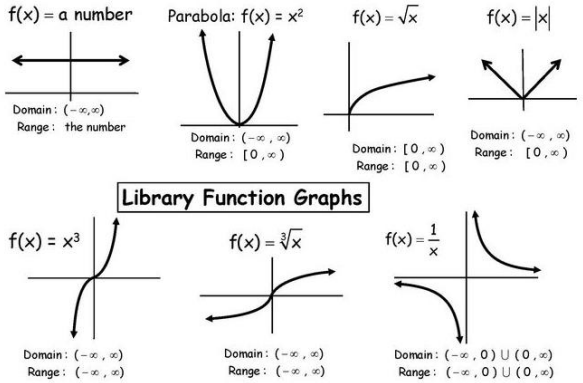
$$f(x) = x^2$$



4. Cubing Function:

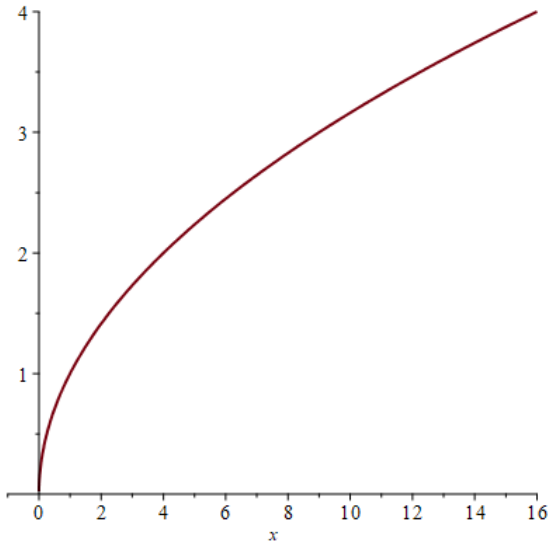
$$f(x) = x^3$$





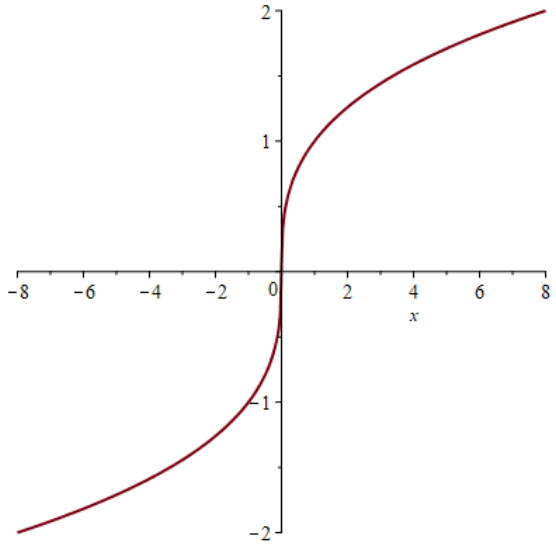
5. Square Root Function:

$$f(x)=\sqrt{x}$$



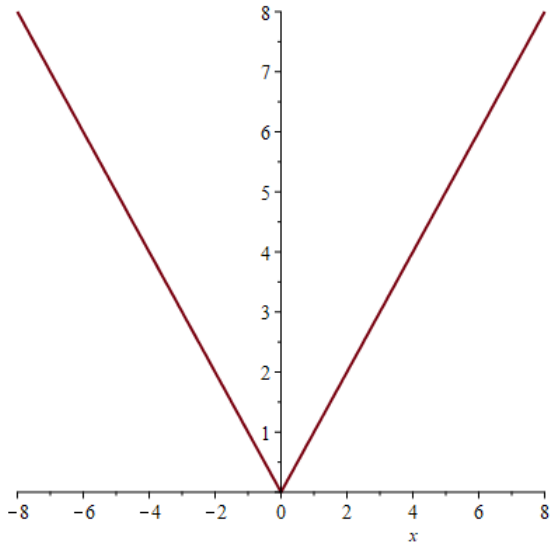
6. Cube Root Function:

$$f(x)=\sqrt[3]{x}$$



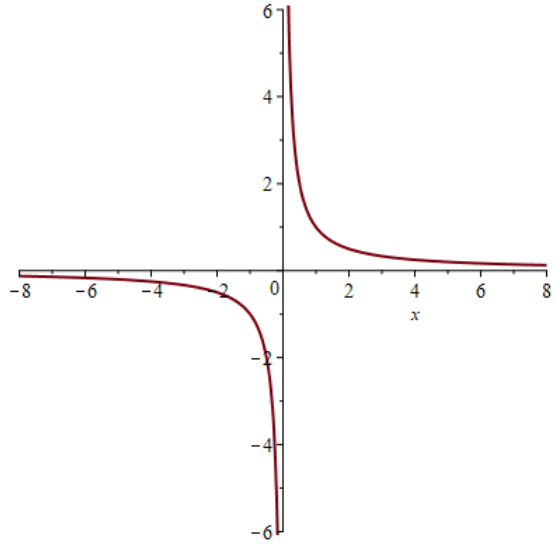
7. Absolute Value Function:

$$f(x) = |x|$$



8. Reciprocal Function:

$$f(x) = \frac{1}{x}$$



Graph the following:

$f(x)=\sqrt{x+2}$

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

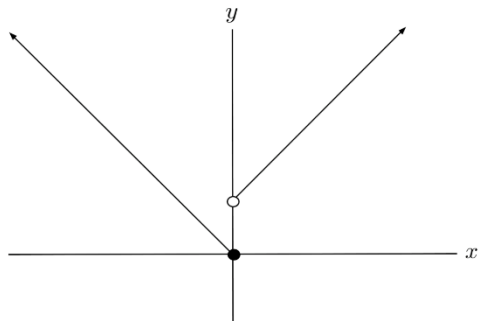
$$f\left(x\right)=\sqrt{\left|x\right|}$$

$$f\left(x\right)=\left|\sqrt[3]{x}\right|$$

Graphing Piecewise-defined Functions Constructed from the Library Functions.

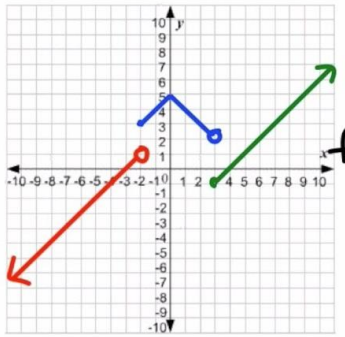
1. $f\left(x\right)=\begin{cases} x;-2<x\leq 0 \\ x^2;0<x\leq 2 \end{cases}$

$$f(x)=\begin{cases} x+3 & \text{if } x>0 \\ -x & \text{if } x\leq 0 \end{cases}$$



2. $g(x)=\begin{cases} x+1; -2 \le x < -1 \\ |x| \; ; -1 \le x < 1 \\ \sqrt{x} \; ; 1 \le x < 4 \end{cases}$

Piecewise Functions



$f(x)=\begin{cases} x+3 & \text{if } x<-2 \\ -|x|+5 & \text{if } -2 \le x < 3 \\ x-4 & \text{if } x \ge 3 \end{cases}$

Combinations of Functions:

$$f+g,\ f-g,\ fg,\ \frac{f}{g},\ f\circ g$$

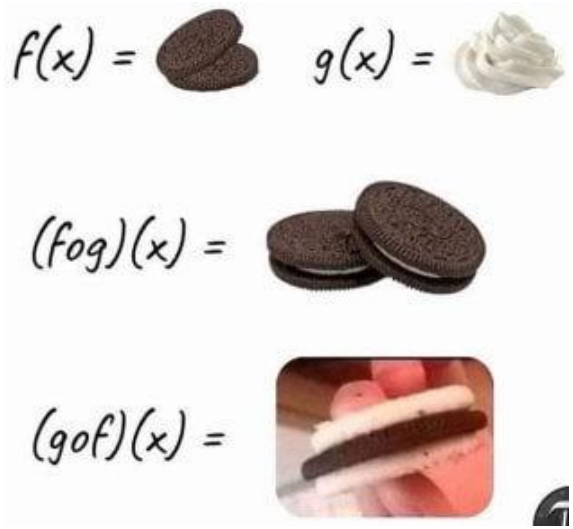
$$(f+g)(x)=f(x)+g(x)$$

$$(f-g)(x)=f(x)-g(x)$$

$$(fg)(x)=f(x)g(x)$$

$$\left(\frac{f}{g}\right)(x)=\frac{f(x)}{g(x)}$$

$$(f\circ g)(x)=f(g(x))$$



$$f(x)=x^2-2,\quad g(x)=\sqrt{x+1}$$

$(f+g)(0)$

$(f-g)(3)$

$(fg)(3)$

$\left(\frac{f}{g}\right)(3)$

$(f\circ g)(3)$

$(f+g)(-1)$

$(f-g)(-2)$

$\left(\frac{f}{g}\right)(-1)$

$\left(\frac{f}{g}\right)(-2)$

$(g\circ f)(3)$

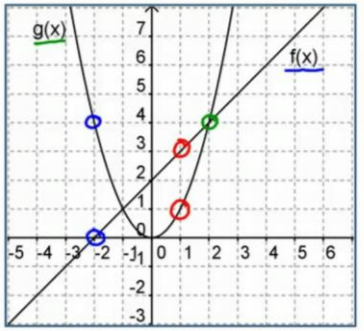
$(g\circ f)(0)$

$(f\circ f)(3)$

$(g\circ g)(3)$

$(f\circ g\circ f)\left(\sqrt{5}\right)$

Combinations from Graphs:



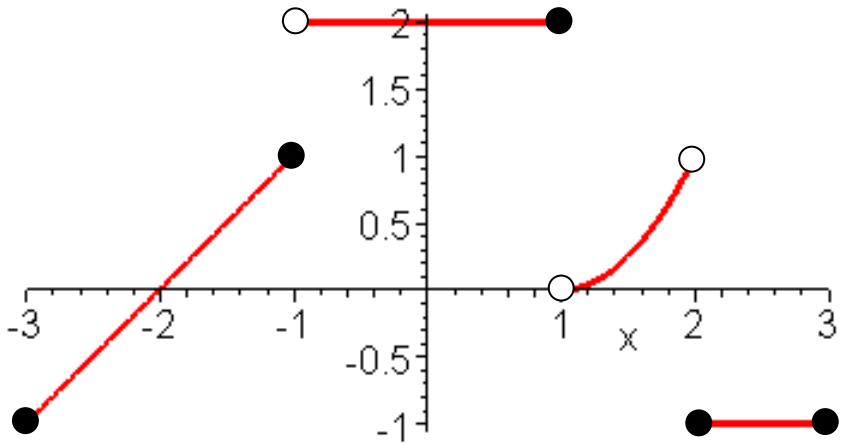
(f + g)(1)= f(1) + g(1) = 3 + 1 = 4

(f - g)(-2)= f(-2) - g(-2) = 0 - 4 = -4

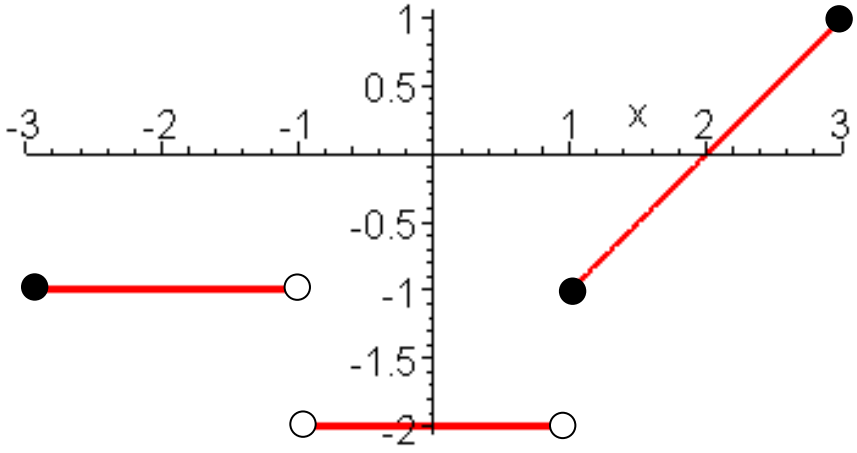
(fg)(2)= f(2) · g(2) = 4 · 4 = 16

(f/g)(-2)=

Graph of *f*



Graph of *g*



$(f+g)(0)$ $\left(\frac{f}{g}\right)(1)$ $(fg)(-3)$

$(f\circ g)(2)$ $(g\circ f)(2)$ $(g\circ g)(0)$ $(f\circ f)(-1)$

$(f\circ g\circ f)(1)$