In-class Practice

Exercise 1: Express the function $h(x)=|x^2-4x+8|$ as a composition of two functions, *f* and *g*, so that $h(x)=(f \circ g)(x)$

Answer:
$$g(x)=x^2-4x+8$$
$$f(x)=|x|$$

In-class Practice

Exercise 2: Express the function $h(x)=(\sqrt{x+5}-1)^3$ as a composition of two functions, *f* and *g*, so that $h(x)=(f \circ g)(x)$

Answer: $g(x)=\sqrt{x+5}-1$

$f(x)=x^3$

Exercise 3: Find the domains of the given functions:

(a) $h(x)=\sqrt{x^2-25}$

Domain: (-∞, -5)∪(5,∞)

(b) $f(x)=x^5$

Domain: all real numbers $\Re$

(c) $g(x)=\dfrac{1}{\sqrt{x+3}}$

Domain: (-3,∞)

(d) $t(x)=\dfrac{2x}{x^2-4}$

Domain: (-∞, -2)∪(-2,2)∪(2,∞)

In-class Practice

Exercise 4: Let $f(x) = 5 + \dfrac{1}{x+1}$ and $g(x) = 3x + 4$.

(a) $(f+g)(x) = 3x + \dfrac{1}{x+1} + 9$, domain: (-∞,-1) ∪ (-1,∞)

(b) $(f-g)(x) = \dfrac{1}{x+1} - 3x + 1$, domain: (-∞,-1) ∪ (-1,∞)

(c) $(fg)(x) = 15x + 20 + \dfrac{3x}{x+1} + \dfrac{4}{x+1}$, domain: (-∞,-1) ∪ (-1,∞)

(d) $\left(\dfrac{f}{g}\right)(x) = \dfrac{5 + \dfrac{1}{x+1}}{3x+4} = \dfrac{5x+6}{(x+1)(3x+4)}$, domain: $(-\infty, -\dfrac{4}{3}) \cup (\dfrac{-4}{3}, -1) \cup (-1, \infty)$

Exercise 5: Let $f(x)=2x+\dfrac{3}{x}$ and $g(x)=\dfrac{1}{x}$.

(a) Find $(f\circ g)(x)$ and determine its domain

$(f\circ g)(x)=f(g(x))=f\left(\dfrac{1}{x}\right)=\dfrac{2}{x}+3x$, domain: $(-\infty,0)\cup(0,\infty)$

(b) $(f\circ g)(2)$
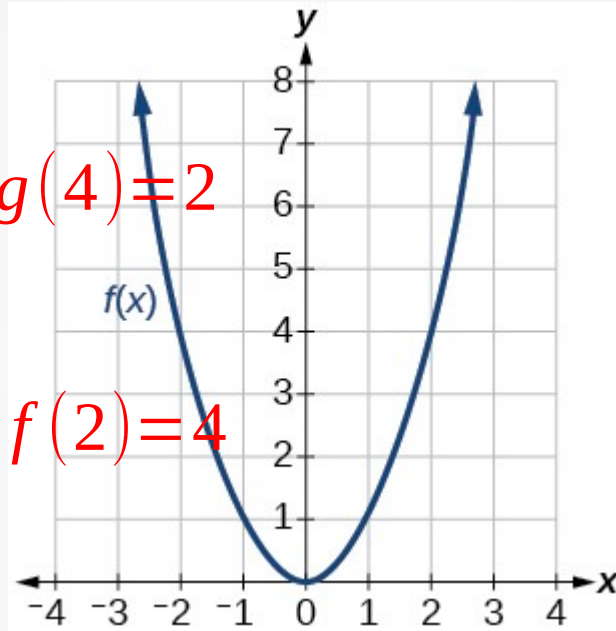
$(f\circ g)(2)=f(g(2))=f\left(\dfrac{1}{2}\right)=2\cdot\dfrac{1}{2}+\dfrac{3}{\dfrac{1}{2}}=1+6=7$
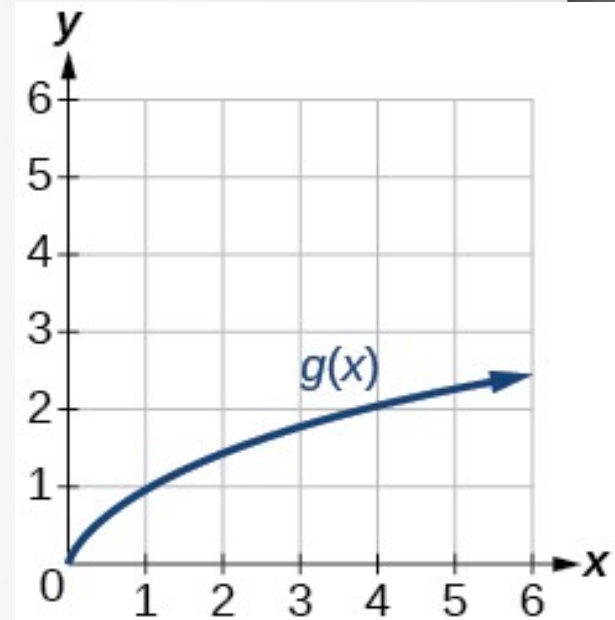
In-class Practice

Exercise 6: Use the graphs of *f(x)*, to the left, and *g(x)*, to the right, to find

(a) $(g \circ f)(2) = g(f(2)) = g(4) = 2$

(b) $(f \circ g)(4) = f(g(4)) = f(2) = 4$

f(x)

zyBooks, figure 1.4.5

g(x)

zyBooks, figure 1.4.6