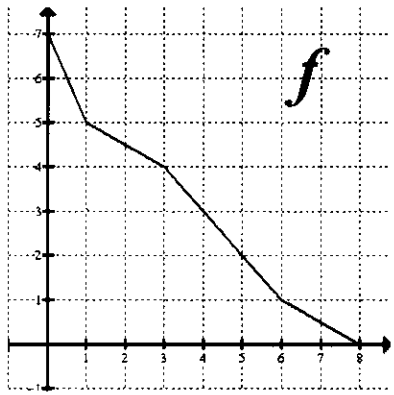
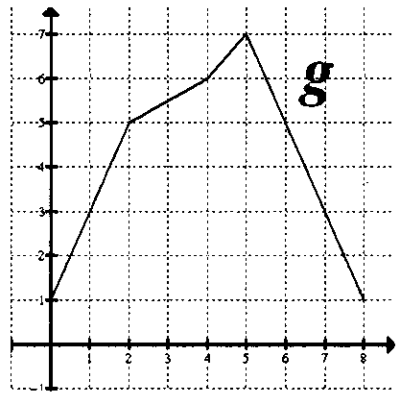
Find two functions f and g such that $(f \circ g)(x) = 4(3x^2 + 2)^5 - 1$. **SCORE: _____ / 2 PTS**

$f(x) = 4x^5 - 1$ $\quad g(x) = 3x^2 + 2$

The graphs of functions f and g are shown on the right. **SCORE: _____ / 4 PTS**

Evaluate the following function values, if they exist. If a value does not exist, write **DNE**.





[a] $(fg)(5) = f(5)g(5)$

$= 2 \cdot 7 = 14$

[b] $(f \circ g)(1) = f(g(1))$

$= f(3) = 4$

[c] $f^{-1}(2) = 5$

[d] $(g \circ f^{-1})(5) = g(f^{-1}(5))$

$= g(1) = 3$

If $f(x) = \dfrac{2x+5}{3-4x}$, find $f^{-1}(x)$. **SCORE: _____ / 4 PTS**

$y = \dfrac{2x+5}{3-4x}$

$x = \dfrac{2y+5}{3-4y}$

$(3-4y)x = 2y+5$

$3x - 4xy = 2y + 5$

$3x - 5 = 4xy + 2y$

$3x - 5 = (4x+2)y$

$y = \dfrac{3x-5}{4x+2}$

$f^{-1}(x) = \dfrac{3x-5}{4x+2}$

Let $f(x)=\frac{6}{x+1}$ and $g(x)=\frac{3}{x+2}$.

SCORE: _____ / 5 PTS

[a] Find $(f \circ g)(x)$.

$$= \frac{6}{\frac{3}{x+2}+1}$$

$$= \frac{6(x+2)}{3+x+2}$$

$$= \frac{6x+12}{x+5}$$

OR

$$= \frac{6}{\frac{3+(x+2)}{x+2}} = \frac{6}{\frac{x+5}{x+2}}$$

$$= \frac{6(x+2)}{x+5} = \frac{6x+12}{x+5}$$

[b] Find the domain of $f \circ g$.

DOMAIN OF $g = \{x \neq -2\}$ DOMAIN OF $f = \{x \neq -1\}$

$g(x) \in$ DOMAIN OF $f \Rightarrow g(x) \neq -1$

$$\frac{3}{x+2} \neq -1$$

$$3 \neq -x-2$$

$$5 \neq -x$$

$$x \neq -5$$

DOMAIN OF $f \circ g = \{x \neq -1$ AND $x \neq -5\}$

The lateral height of a trophy varies directly as its lateral area and inversely as the square root of its base area. **SCORE: _____ / 5 PTS**
If a trophy with a lateral area of 60 square inches and a base area of 9 square inches has a lateral height of 5 inches, find the lateral height of a trophy with a lateral area of 140 square inches and a base area of 25 square inches.

h = LATERAL HEIGHT

A = LATERAL AREA

B = BASE AREA

$$h = \frac{kA}{\sqrt{B}}$$

$$5 = \frac{k(60)}{\sqrt{9}} = \frac{60k}{3} = 20k$$

$$k = \frac{1}{4}$$

$$h = \frac{A}{4\sqrt{B}}$$

$$h = \frac{140}{4\sqrt{25}}$$

$$h = \frac{140}{20} = 7 \text{ INCHES}$$