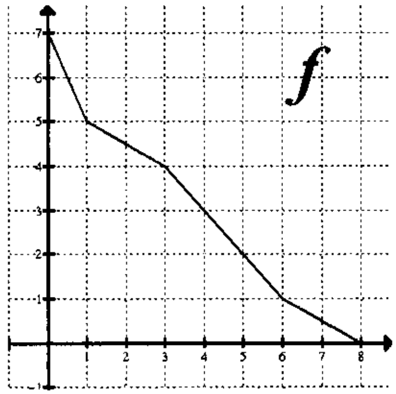
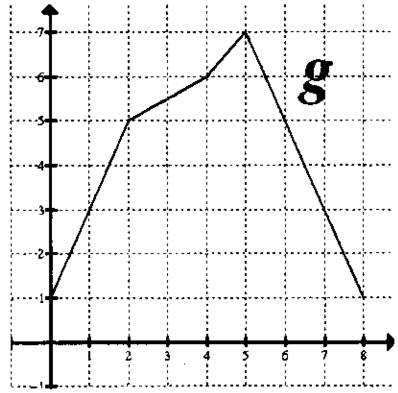
Find two functions f and g such that $(f \circ g)(x) = \dfrac{5}{(4x^2+2)^3}$. SCORE: ______ / 2 PTS

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

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] $(fg)(4) = f(4)g(4)$

$= 3 \cdot 6 = 18$

[b] $(f \circ g)(4) = f(g(4))$

$= f(6) = 1$

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

[d] $(g \circ f^{-1})(2) = g(f^{-1}(2))$

$= g(5) = 7$

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

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

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

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

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

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

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

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

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

Let $f(x) = \frac{3}{x+2}$ and $g(x) = \frac{6}{x+1}$. **SCORE: ______ / 5 PTS**

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

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

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

$$= \frac{3x+3}{2x+8}$$

OR $= \frac{3}{\frac{6+2(x+1)}{x+1}} = \frac{3}{\frac{2x+8}{x+1}}$

$= \frac{3(x+1)}{2x+8} = \frac{3x+3}{2x+8}$

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

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

$g(x) \in$ DOMAIN OF $f \Rightarrow g(x) \neq -2$

$$\frac{6}{x+1} \neq -2$$

$$6 \neq -2x - 2$$

$$8 \neq -2x$$

$$x \neq -4$$

DOMAIN OF $f \circ g = \{x \neq -1$ AND $x \neq -4\}$

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 16 square inches has a lateral height of 5 inches, find the lateral height of a trophy with a lateral area of 90 square inches and a base area of 25 square inches.

h = LATERAL HEIGHT
A = LATERAL AREA
B = BASE AREA

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

$$5 = \frac{k(60)}{\sqrt{16}} = \frac{60k}{4} = 15k$$

$$k = \frac{1}{3}$$

$$h = \frac{A}{3\sqrt{B}}$$

$$h = \frac{90}{3\sqrt{25}}$$

$h = \frac{90}{15} = 6$ INCHES