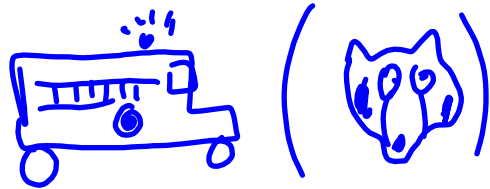


Composite Functions

Function Notation

$f(x)$



Let $f(x) = x^3 - 2x + 4$

Determine $f(-2) = (-2)^3 - 2(-2) + 4$
 $= -8 + 4 + 4$
 $= 0$

Let $f(x) = x^2 + 7$

and $g(x) = -3x$

$$f(g(x)) \rightarrow f(-3x) = (-3x)^2 + 7 \\ = 9x^2 + 7$$

$$g(f(x)) = g(x^2 + 7) \\ = -3(x^2 + 7) \\ = -3x^2 - 21$$

$$f(x) = x^2 + 7$$

$$g(x) = -3x$$

$$f[f(x)] = f(x^2 + 7)$$

$$\begin{aligned} (x^2 + 7)(x^2 + 7) &= (x^2 + 7)^2 + 7 \\ &= x^4 + 14x^2 + 49 + 7 \\ &= x^4 + 14x^2 + 56 \end{aligned}$$

$$(a+b)^2 \rightarrow a^2 + 2ab + b^2$$

$$\text{if } f(x) = 2x - 3$$

Determine $f(f^{-1}(x))$

switch x and y , solve for y .

$$f^{-1}(x) \rightarrow x = 2y - 3$$

$$x + 3 = 2y$$

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

$$f(f^{-1}(x))$$

$$= f\left(\frac{x+3}{2}\right)$$

$$= 2\left(\frac{x+3}{2}\right) - 3$$

$$= x + 3 - 3$$

$$= x$$

$$g(x) = x^2 + 12$$

Determine $g(g^{-1}(x))$

$$g^{-1}(x) \rightarrow x = y^2 + 12$$

$$x - 12 = y^2$$

$$\pm\sqrt{x-12} = y$$

$$\begin{aligned} &g(g^{-1}(x)) \\ &= g(\sqrt{x-12}) \\ &= (\sqrt{x-12})^2 + 12 \\ &= x - 12 + 12 \\ &= x \end{aligned}$$

pg. 435 # 4

pg. 447 # 1 - 4, 8, 9