

January 30

Function Operations (Again)

Given $f(x) = 6x - 5$, $g(x) = x^2 + 1$, and $h(x) = 2x + 7$, find:

$$\begin{aligned} \text{Ex 1 } (g+h)(x) &= (x^2+1) + (2x+7) \\ &= x^2+1+2x+7 \\ &= \boxed{x^2+2x+8} \end{aligned}$$

$$\begin{aligned} \text{Ex 2 } (h-f)(x) &= (2x+7) - (6x-5) \\ &= 2x+7-6x+5 \\ &= \boxed{-4x+12} \end{aligned}$$

$$\begin{aligned} \text{Ex 3 } (g \cdot f)(x) &= (x^2+1)(6x-5) \\ &= \boxed{6x^3 - 5x^2 + 6x - 5} \end{aligned}$$

Compositions of Functions

● $(f \circ g)(x) \rightarrow f(g(x))$ "f of g of x"

- putting one function into another

- NOT multiplication!

Given $f(x) = x^2 + 1$ and $g(x) = x + 2$, find:

● (Ex 4) $(f \circ g)(2) = f(g(2))$

$$= f(4)$$

$$= (4)^2 + 1$$

$$= \boxed{17}$$

$$g(2) = (2) + 2 = 4$$

$$f(x) = x^2 + 1$$

● (Ex 5) $(g \circ f)(2) = g(f(2))$

$$= g(5)$$

$$= (5) + 2$$

$$= \boxed{7}$$

$$f(2) = (2)^2 + 1 = 5$$

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

Given $f(x) = 2x + 1$ and $g(x) = 6x - 4$, find:

(Ex 6) $(f \circ g)(x) = f(g(x))$
 $= f(6x - 4)$
 $= 2(6x - 4) + 1$
 $= 12x - 8 + 1$
 $= \boxed{12x - 7}$

$g(x) = 6x - 4$
 $f(x) = 2\cancel{x} + 1$

(Ex 7) $(g \circ f)(x) = g(f(x))$
 $= g(2x + 1)$
 $= 6(2x + 1) - 4$
 $= 12x + 6 - 4$
 $= \boxed{12x + 2}$

$f(x) = 2x + 1$
 $g(x) = 6\cancel{x} - 4$

Given $f(x) = x^2 - 2$, $g(x) = 3x + 1$, and $h(x) = 4x$, find:

(Ex 8) $f(g(x)) = f(3x + 1)$

$$= (3x + 1)^2 - 2$$

$$= (3x + 1)(3x + 1) - 2$$

$$= 9x^2 + 3x + 3x + 1 - 2$$

$$= \boxed{9x^2 + 6x - 1}$$

$$g(x) = 3x + 1$$

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

(Ex 9) $f(h(x)) = f(4x)$

$$= (4x)^2 - 2$$

$$= (4x)(4x) - 2$$

$$= \boxed{16x^2 - 2}$$

$$h(x) = 4x$$

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

(Ex 10) $h(h(x)) = h(4x)$

$$= 4(4x)$$

$$= \boxed{16x}$$

$$h(x) = 4x$$

$$h(x) = 4x$$