

P116 #1 $f(x) = 2x-1$ $g(x) = x^2$

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

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

$$f(x) \cdot g(x) = (2x-1) \cdot x^2 = 2x^3 - x^2$$

#2 $f(x) = (x-1)^2$ $g(x) = 3-x$

Special case

$$(a-b)^2 = a^2 - 2ab + b^2$$

↓
2. first term. last term.

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

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

$$= x^2 - 3x + 4$$

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

	x	-1	
x	x^2	$-x$	
-1	$-x$	1	$-2x$

$$f(x) - g(x) = (x-1)^2 - (3-x)$$

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

$$= x^2 - x - 2$$

$$f(x) \cdot g(x) = (x-1)^2 \cdot (3-x)$$

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

$$= 3x^2 - x^3 - 6x + 2x^2 + 3 - x$$

$$= -x^3 + 5x^2 - 7x + 3$$

#3 $f(x) = \sqrt{x}$ $g(x) = \sin x$

$$f(x) + g(x) = \sqrt{x} + \sin x$$

$$f(x) - g(x) = \sqrt{x} - \sin x$$

$$f(x) \cdot g(x) = \sqrt{x} \cdot \sin x$$

#4 $f(x) = \sqrt{x+5}$ $g(x) = |x+3|$

$$f(x) + g(x) = \sqrt{x+5} + |x+3|$$

$$f(x) - g(x) = \sqrt{x+5} - |x+3|$$

$$f(x) \cdot g(x) = \sqrt{x+5} \cdot |x+3|$$

11 $f(x) = 2x - 3$ $g(x) = x + 1$

$$(f \circ g)(3) = f(g(3)) = 2(3+1) - 3 = 6 + 2 - 3 = 5$$

$$= f(3+1) = f(4) = 2 \cdot 4 - 3 = 8 - 3 = 5$$

$$(g \circ f)(-2) = g(f(-2)) = g(2(-2) - 3) = g(-7) = -7 + 1 = -6$$

plugging
in $g(x)$

12 $f(x) = x^2 - 1$; $g(x) = 2x - 3$

$$(f \circ g)(3) = f(g(3)) = f(2 \cdot 3 - 3) = f(3) = 3^2 - 1 = 9 - 1 = 8$$

$$(g \circ f)(-2) = g(f(-2)) = g((-2)^2 - 1) = g(3) = 6 - 3 = 3$$

13) $f(x) = x^2 + 4$ $g(x) = \sqrt{x+1}$

$$(f \circ g)(3) = f(g(3)) = f(\sqrt{3+1}) = f(\sqrt{4}) = f(2)$$

$$= 2^2 + 4 = 4 + 4$$

$$(f \circ g)(3) = 8$$

$$(g \circ f)(-2) = g(f(-2)) = g((-2)^2 + 4) = g(4+4) = g(8)$$

$$= \sqrt{8+1} = \sqrt{9} = 3$$

$$(g \circ f)(-2) = 3$$

14) $f(x) = \frac{x}{x+1}$ $g(x) = 9 - x^2$

$$(f \circ g)(3) = f(g(3)) = f(9 - 3^2) = f(0)$$

$$= \frac{0}{0+1} = \frac{0}{1} = 0$$

$$(g \circ f)(-2) = g(f(-2)) = g\left(\frac{-2}{-2+1}\right) = g(2) = 9 - 2^2$$

$$= 9 - 4 = 5$$