

# FUNCTIONS & TRIGONOMETRY

201-009-DW

## Assignment 4 SOLUTIONS

$$f(x) = 2x - 3$$

$$g(z) = -z^2 - 1$$

$$h(t) = t^2 - t + 2$$

$$(a) f(2x) = 2(2x) - 3 = \boxed{4x - 3}$$

$$g(2x) = -(2x)^2 - 1 = \boxed{-4x^2 - 1}$$

$$h(2x) = (2x)^2 - 2x + 2 = \boxed{4x^2 - 2x + 2}$$

$$(b) 2f(x) = 2(2x - 3) = \boxed{4x - 6}$$

$$2g(x) = 2(-x^2 - 1) = \boxed{-2x^2 - 2}$$

$$2h(x) = 2(x^2 - x + 2) = \boxed{2x^2 - 2x + 4}$$

$$(c) xf(2) = x(2(2) - 3) = x(4 - 3) = \boxed{x}$$

$$xg(2) = x(-2^2 - 1) = x(-5) = \boxed{-5x}$$

$$xh(2) = x(2^2 - 2 + 2) = x(4) = \boxed{4x}$$

$$(d) (f \circ g)(x) = f(g(x)) = f(-x^2 - 1)$$

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

$$= -2x^2 - 2 - 3 = \boxed{-2x^2 - 5}$$

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

$$= -(2x - 3)^2 - 1 = -(4x^2 - 12x + 9) - 1$$

$$= \boxed{-4x^2 + 12x - 10}$$

$$(f) (h \circ g)(t) = h(g(t))$$

$$= h(-t^2 - 1)$$

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

$$(g) (f \circ h)(t) = f(h(t))$$

$$= \boxed{t^4 + 3t^2 + 4}$$

$$= f(t^2 - t + 2) = 2(t^2 - t + 2) - 3$$

$$= \boxed{2t^2 - 2t + 1}$$

$$(h) (f \circ g \circ h)(x)$$

$$= (f \circ g)(h(x))$$

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

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

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

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

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

$$= f(-x^4 + 2x^3 - 5x^2 + 4x - 5)$$

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

$$= \boxed{-2x^4 + 4x^3 - 10x^2 + 8x - 13}$$