

Compositions and Operations of Functions

1.6

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

- $(f+g)(x)$

$$= x^2 + 2x - 4$$
- $(h \cdot g)(x)$

$$(1-4x)(2x-3)$$

$$= 2x - 3 - 8x^2 + 12x$$

$$= -8x^2 + 14x - 3$$
- $(g-h)(x)$

$$(2x-3) - (1-4x)$$

$$2x - 3 - 1 + 4x$$

$$6x - 4$$
- $(g-f)(x)$

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

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

$$-x^2 + 2x - 2$$

Given $f(x) = 3x + 3$, $g(x) = 6x - 5$, and $h(x) = x^2 + 14$, find the following:

- $f(g(-3)) = f(-23)$

$$= -66$$
- $(f \circ h)(7) = f(63)$

$$= 192$$
- $g(h(24)) = g(590)$

$$= 3535$$
- $(h \circ f)(9) = h(30)$

$$= 914$$
- $g(f(0)) = g(3)$

$$= 13$$
- $(h \circ g)(-4) = h(-29)$

$$= 855$$

Given $f(x) = 9 - x$, $g(x) = x^2 + 3$, and $h(x) = x - 2$, find the following:

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

$$= g(9-x) = (9-x)^2 + 3$$

$$= 81 - 18x + x^2 + 3$$

$$= x^2 - 18x + 84$$
- $f(g(x))$

$$= f(x^2+3) = 9 - (x^2+3)$$

$$= -x^2 + 6$$
- $(h \circ f)(x)$

$$= h(9-x) = (9-x) - 2$$

$$= -x + 7$$
- $f(h(x))$

$$= f(x-2) = 9 - (x-2)$$

$$= -x + 11$$
- $(h \circ g)(x)$

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

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

$$= g(x^2+3) = (x^2+3)^2 + 3$$

$$= x^4 + 6x^2 + 12$$

17. A toy manufacturer has a new product to sell. The number of units to be sold, x , is a function of the price p : $n(p) = 30 - 25p$. The revenue r earned is a function of the number of units sold x :

$r(x) = 1000 - \frac{1}{4}x^2$ Find the function for revenue r in terms of price, p . *plug 1st function into second.*

$$r(p) = 1000 - \frac{1}{4}(30 - 25p)^2 = 1000 - \frac{1}{4}(900 - 1500p + 625p^2) = 775 + 375p - 156.25p^2$$

18. Tyrone Davis has \$180 deducted from every paycheck for retirement. He can have these deductions taken before taxes are applied, which reduces his taxable income. His federal income tax rate is 18%. If Tyrone earns \$2200 every pay period, find the difference in his net income if

- he has the retirement deduction taken before taxes
 $\$2200 - 180 = \2020 , $\frac{2020}{.18} = \$11222.22$ tax deduction. $\$2020 - 11222.22 = -9202.22$ so net = 1656.4
- he has the retirement deduction taken after taxes
 $\frac{2200}{.18} = \$12222.22$ tax deduction so $1804 - 180 = 1624$ net.
- Which scenario would you choose and why?
1st, better to take 180 out before taxes. get about an extra 30 bucks