Section 6-6 continued

Composition of Two Functions

Many real-world situations involve compositions of functions:

-the cost of gas for a trip depends on the number of gallons you buy. The number of gallons you buy depends on the number of miles of the trip.

This chain of relationships is an example of composition of functions.

When you apply a function rule on the result of another function rule, you compose the functions (or put them into one).

$f \circ g = f(g(x))$ read "f of g of x"

and

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

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Let $f(x) = x^2 + 4$ and $g(x) = (2x)$

a) find $f \circ g$ (plug in the value of g(x) for the x in f(x))

$f(g(x)) = (2x)^2 + 4 = 4x^2 + 4$

b) find $g \circ f$ (plug in the value of f(x) for the x in g(x))

$g(f(x)) = 2(x^2 + 4) = 2x^2 + 8$

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

Find f∘g $-2(-2x)^2 + 3$

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

$-8x^2 + 3$

Find g∘f $-2(-2x^2 + 3) = 4x^2 - 6$

$f(x) = 2x - 3$
$g(x) = x + 4$

Find f∘g $2(x+4) - 3$

$2x + 8 - 3 = 2x + 5$

Find g∘f $(2x - 3) + 4 = 2x + 1$

We can also evaluate the composition of two functions for a number. Video

if $f(x) = x^2 + 6$ and $g(x) = -5x - 2$ find:

$(f \circ g)(-2) = f(g(-2))$ 10

$-5(-2) - 2 = 8$

$f(8) = 8^2 + 6 = 64 + 6 = 70$

$(g \circ g)(2) = g(g(2))$ -12

$-5(2) - 2 = -12$

$-5(-12) - 2 = 60 - 2 = 58$

Homework:
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