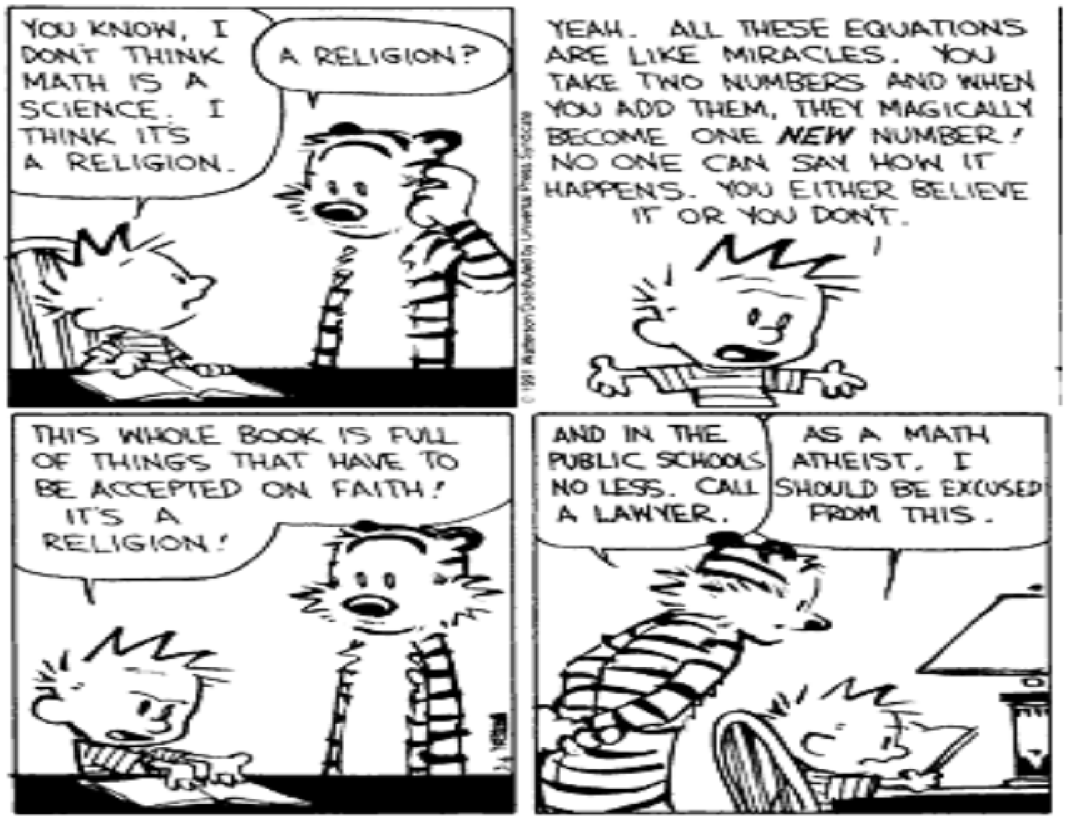
Combination of Functions

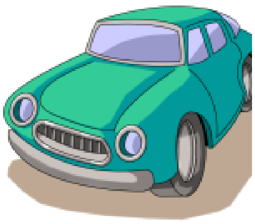
(2.6)


YOU KNOW, I DON'T THINK MATH IS A SCIENCE. I THINK IT'S A RELIGION.
A RELIGION?
YEAH. ALL THESE EQUATIONS ARE LIKE MIRACLES. YOU TAKE TWO NUMBERS AND WHEN YOU ADD THEM, THEY MAGICALLY BECOME ONE NEW NUMBER! NO ONE CAN SAY HOW IT HAPPENS. YOU EITHER BELIEVE IT OR YOU DON'T.
THIS WHOLE BOOK IS FULL OF THINGS THAT HAVE TO BE ACCEPTED ON FAITH! IT'S A RELIGION!
AND IN THE PUBLIC SCHOOLS NO LESS. CALL A LAWYER.
AS A MATH ATHEIST, I SHOULD BE EXCUSED FROM THIS.

The suggested retail price of a new hybrid car is p dollars. The dealership advertises a factory rebate of $2000 and a 10% discount.

$f(p) = p - 2000$

$g(p) = .9p$



Notes 2-6 Combinations of Functions

1. Sum: $(f+g)(x) = f(x) + g(x)$

2. Difference: $(f-g)(x) = f(x) - g(x)$

3. Product: $(fg)(x) = f(x) \cdot g(x)$

4. Quotient: $\left(\dfrac{f}{g}\right)(x) = \dfrac{f(x)}{g(x)}, g(x) \neq 0$

Domain?

a domain in common
to all.

Ex 1 $f(x) = x^2 + 3x$ and $g(x) = 4x - 1$.
Find the following.

a) $(f - g)(x) = x^2 + 3x - (4x-1)$

$= x^2 - x + 1$

b) $(fg)(x) = (x^2+3x)(4x-1)$

$4x^3 - x^2 + 12x^2 - 3x = 4x^3 + 11x^2 - 3x$

c) $(f+g)(2) = x^2+3x + 4x-1$

$= x^2 + 7x - 1$

$= (2)^2 + 7(2) - 1 = 17$

$f(x) = \sqrt{x}$ $\qquad$ $g(x) = \sqrt{4 - x^2}$

$x \geq 0$ $\qquad$ $-2 \leq x \leq 2$

find $\frac{f}{g}(x) = \frac{\sqrt{x}}{\sqrt{4-x^2}}$, $0 \leq x < 2$

find $\frac{g}{f}(x) = \frac{\sqrt{4-x^2}}{\sqrt{x}}$, $0 < x \leq 2$

The composition of the function f with the function g is

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

Ex 2 $\quad f(x) = \sqrt{x+4}$ and $g(x) = x^2$

$x \geq -4$ $\quad$ all $\mathbb{R}$'s $\Rightarrow$ $\quad x \geq -4$

Find the following:

a) $f \circ g = f(g(x)) = \sqrt{(x^2)+4} = \sqrt{x^2+4}$, $x \geq -4$

b) $g \circ f = g(f(x)) = \left(\sqrt{x+4}\right)^2 = x+4$, $x \geq 4$

Domain?

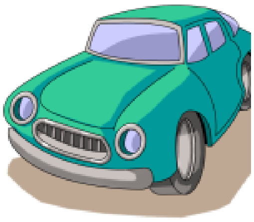
$f(x) = \sqrt{x+4}$ and $g(x) = x^2$

domain of $f(g(x))$?

domain of $g(f(x))$?

The suggested retail price of a new hybrid car is p dollars. The dealership advertises a factory rebate of $2000 and a 10% discount. $F(p) = p - 2000$

$g(p) = .9p$



$f(g(p)) = (.9p) - 2000 = .9p - 2000$

$g(f(p)) = .9(p - 2000) = .9p - 1800$

Find two functions f and g such that $(f \circ g)(x) = h(x)$

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

$f(x) = x^3$

$g(x) = 1 - x$

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

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

$g(x) = x$

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

HW: Pg. 238
8-11, 17-21, 36-42 evens,
48, 49, 63