Algebra with Functions

Saturday, September 5, 2020 4:57 PM

Section 1.4.

Algebraic Operations (with functions)

- **add**: $f(x) + g(x) = h(x)$
- **subtract**: $f(x) - g(x)$
- **multiply**: $f(x) \cdot g(x)$
- **divide**: $\frac{f(x)}{g(x)}$
- **Composition**: $f(g(x))$

Ex. $f(x) = 2x - 1$, $g(x) = \frac{1}{x}$

Compute:

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

OR:

$$f(2) + g(2) = 2(2) - 1 + \frac{1}{2} = 3.5$$

$$f(x) - g(x) = \quad , \quad (\quad)$$

$$f(x) - g(x) = 2x - 1 - \left(\frac{1}{x}\right)$$

$$f(x) \cdot g(x) = (2x-1) \cdot \frac{1}{x}$$

$$\frac{f(x)}{g(x)} = \frac{2x-1}{1/x}$$

Composition: $f(x) = 2x-1$, $g(x) = 1/x$

$$f(g(x)) = 2\left(\frac{1}{x}\right) - 1$$

AND

$$g(f(x)) = \frac{1}{2x-1}$$

Ex. Let $h(x) = (x+1)^2$.

What $f(x)$ & $g(x)$ give:

$$h(x) = f(g(x)).$$

Let's guess: $f(x) = x^2$

$g(x) = x + 1$.

$f(2) = 2^2$

$f(\text{☺}) = \text{☺}^2$

$f(\blacksquare) = \blacksquare^2$

$$f(g(x)) = (x+1)^2 = h(x).$$