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MATH 2311
Pre-Calculus I
Ms. Palmer

1.8. Operations on Functions.

Addition: $f(x) = x^2 - 4x + 3$.

$g(x) = 2x + \sqrt{x} - 5$.

$(f+g)(x)$ or $f(x) + g(x)$ or $f+g$.

$(f+g)(x) = (x^2 - 4x + 3) + (2x + \sqrt{x} - 5)$.

$\boxed{(f+g)(x) = x^2 - 2x - 2 + \sqrt{x}}$

Domain of $(f+g)(x)$

Let A represent the domain of f and B represent the domain of G.

Domain of $(f+g)x = A \cap B$.

$A : (-\infty, \infty)$

$B : [0, \infty)$

$A \cap B$ = Domain of $(f+g)x = [0, \infty)$.

Subtraction:

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

$f(x) = 2x - 3$, $g(x) = x^2 + 4x - 7$.

$g - f = (x^2 + 4x - 7) - (2x - 3)$.

$= x^2 + 4x - 7 - 2x + 3$.

$= x^2 + 2x - 4$

Domain:

Domain of $g \Rightarrow D: (-\infty, \infty)$.

" " $f \Rightarrow D: (-\infty, \infty)$.

$D_{g \cdot f} = (-\infty, \infty)$.

Multiplication:

$(fg)(x) = fg = (f \cdot g)(x) = f(x)\,g(x)$.

$f(x) = 2x^2 - 5x + 1$, $g(x) = 2x + 3$.

$(f \cdot g)(x) = (2x^2 - 5x + 1)(2x + 3)$.

$= 4x^3 + 6x^2 - 10x^2 - 15x + 2x + 3$.

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

$D: (-\infty, \infty)$.

$f(x) = \sqrt{x-3}$ $\qquad$ $g(x) = \dfrac{1}{x-7}$.

$D: [3, \infty)$ $\qquad$ $D: (-\infty, 7) \cup (7, \infty)$.

$(g \cdot f)(x)$.

$D: [3, 7) \cup (7, \infty)$

$(g \cdot f)(x) = \dfrac{1}{x-7} \cdot \dfrac{\sqrt{x-3}}{1} = \boxed{\dfrac{\sqrt{x-3}}{x-7}}$.

Division:

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = f/g.$$

Example: $f(x) = x^2 - 3x + 5$, $g(x) = x - 1$.

$D: (-\infty, \infty)$. $D: (-\infty, \infty)$.

$$\left(\frac{f}{g}\right)(x) = \frac{x^2 - 3x + 5}{x - 1}.$$

$D: (-\infty, 1) \cup (1, \infty)$.

$f(x) = \sqrt{x+3} - 1$ $g(x) = x + 2$.

$(f \cdot g)(6)$?

$(f \cdot g)(6) = f(6) \cdot g(6)$.

$= (\sqrt{6+3} - 1)(6+2)$.

$= (2)(8) = \boxed{16}$.