October 25, 2017

$f(x) = 2x - 5$

$g(x) = x^2 - 4$

Operations on Functions

① addition (subtraction)

② multiply

③ Divide

④ Compose

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$f(x) = 2x - 5$ & $g(x) = x^2 - 4$

① add: $f(x) + g(x)$

$(2x-5) + (x^2-4)$

$2x - 5 + x^2 - 4$

$\boxed{x^2 + 2x - 9}$

② Subtraction

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

$(2x-5) - (x^2-4)$

$2x - 5 - x^2 + 4$

$\boxed{-x^2 + 2x - 1}$

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

$(x^2-4) - (2x-5)$

$x^2 - 4 - 2x + 5$

$\boxed{x^2 - 2x + 1}$

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③ multiplication

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

$(2x-5)(x^2-4)$

$2x^3 - 8x - 5x^2 + 20$

$\boxed{2x^3 - 5x^2 - 8x + 20}$

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

$(x^2-4)(2x-5)$

$\boxed{2x^3 - 5x^2 - 8x + 20}$

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④ Division

a.) $\frac{f(x)}{g(x)} = \frac{2x-5}{x^2-4}$

$= \frac{2x-5}{(x+2)(x-2)} \neq 0$

* $g(x) \neq 0$

* Domain: $x \neq \pm 2$

$(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

b.) $\frac{g(x)}{f(x)} = \frac{x^2-4}{2x-5 \neq 0}$

$2x \neq 5$

$x \neq 5/2$

* $f(x) \neq 0$

Domain:

$(-\infty, 5/2) \cup (5/2, \infty)$

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⑤ Composition of Functions

$f(x) = 2x - 5$

$g(x) = x^2 - 4$

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

$= f(x^2 - 4)$

$= 2(x^2-4) - 5$

$= 2x^2 - 8 - 5$

$= \boxed{2x^2 - 13}$

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

$= g(2x - 5)$

$= (2x-5)^2 - 4$

$= (2x-5)(2x-5) - 4$

$= 4x^2 - 20x + 25 - 4$

$= \boxed{4x^2 - 20x + 21}$

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