October 20, 2015

* Exam #2 – October 30
60% New
40% Prior

Oct 20-10:02 AM

9.5 Algebra of Functions

I Operations: $f(x)$ & $g(x)$

① Addition: $f(x) + g(x)$

② Difference: $f(x) - g(x)$

③ Multiplication: $f(x) \cdot g(x)$

④ Quotient: $\frac{f(x)}{g(x)}$

II Composition

① $(f \circ g)(x)$

f of g of x

② $(f \circ f)(x)$

③ $(g \circ f)(x)$

④ $(g \circ g)(x)$

⑤ $(f \circ g \circ f)(x)$

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$f(x) = x^2 - x$ & $g(x) = 3x - 2$

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

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

② $f(x) - g(x) = x^2 - x - (3x - 2)$

$= x^2 - x - 3x + 2$

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

②.2 $g(x) - f(x) = 3x - 2 - (x^2 - x)$

$= 3x - 2 - x^2 + x$

$= 4x - 2 - x^2$

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

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③ $f(x) \cdot g(x) = (x^2 - x)(3x - 2)$ FOIL

$= 3x^3 - 2x^2 - 3x^2 + 2x$

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

④ $\frac{f(x)}{g(x)} = \frac{x^2 - x}{3x - 2} = \frac{x(x-1)}{3x-2}$

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④.2 $\frac{f(x)}{g(x)} = \left(\frac{f}{g}\right)(x)$

(a) $\left(\frac{f}{g}\right)(-2) = \frac{(-2)^2 - (-2)}{3(-2) - 2} = \frac{4 + 2}{-6 - 2}$

$= \frac{6}{-8}$

$= -\frac{3}{4}$

(b) $\left(\frac{f}{g}\right)\left(\frac{2}{3}\right) = \frac{\left(\frac{2}{3}\right)^2 - \left(\frac{2}{3}\right)}{3\left(\frac{2}{3}\right) - 2}$

$= \frac{\frac{4}{9} - \frac{2}{3}}{2 - 2} = \frac{}{0}$

* So $\left(\frac{f}{g}\right)\left(\frac{2}{3}\right)$ is undefined

Domain: the Valid x values of a function

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

$f(x) = x^2 - x$

$g(x) = 3x - 2$

$= (3x-2)^2 - (3x-2)$

$= (3x-2)(3x-2) - 3x + 2$

$= 9x^2 - 12x + 4 - 3x + 2$

$= \boxed{9x^2 - 15x + 6}$

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

$= 3(x^2 - x) - 2$

$= \boxed{3x^2 - 3x - 2}$

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$f(x) + g(x) \rightarrow (f+g)(x)$

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