

September 19, 2016
 * Wednesday Quiz
 on finding Domain

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The Algebra of Functions
 Operations on Functions
 ① Addition

$$(f+g)(x) = f(x) + g(x)$$

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

Combine Like terms

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

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What are Like Terms?
 ① must have same variable
 ② Variables must have same exponent
 e.g. $7xy^2 + (-3xy^2)$
 $(7 + (-3))xy^2$
 $4xy^2$

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② Subtraction

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

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

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

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

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③ Multiplication

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

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

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

$$= 3x^3 - 5x^2 + 2x$$

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④ Division

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} ; g(x) \neq 0$$

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

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⑤ Composition

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

f composed of g

$$\begin{aligned} &= f(3x-2) \\ &= (3x-2)^2 - (3x-2) \\ &= (3x-2)(3x-2) - (3x-2) \\ &= 9x^2 - 12x + 4 - 3x + 2 \\ &= 9x^2 - 15x + 6 \end{aligned}$$

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$$\begin{aligned} (g \circ f)(x) &= g(f(x)) \\ &= 3(\quad) - 2 \\ &= 3(x^2 - x) - 2 \\ &= 3x^2 - 3x - 2 \end{aligned}$$

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$$\begin{aligned} (f \circ f)(x) &= f(f(x)) \\ &= x^2 - x \\ &= (x^2 - x)^2 - (x^2 - x) \\ &= (x^2 - x)(x^2 - x) - x^2 + x \\ &= x^4 - 2x^3 + x^2 - x^2 + x \\ &= x^4 - 2x^3 + x \end{aligned}$$

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$$\begin{aligned} g(m) &= m^2 + 4 + 2m \\ h(m) &= -3m + 2 \\ (g \circ h)(1) &= [(1)^2 + 4 + 2(1)] [-3(1) + 2] \\ &= [1 + 4 + 2] [-3 + 2] \\ &= [7] [-1] \\ &= -7 \end{aligned}$$

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