Honors Algebra II

Unit 4 – Functions

MATH, ENGINEERING, AND SCIENCE ACADEMY

Functions Homework #2 Name: Papi Keys

**Short Answer:** Show all work. Any answers requiring written responses must be in complete sentences.

**1.** If $f(x) = 2x^3 - 5x + 3$ and $g(x) = 3x^2 - 9$, find $f(x) - g(x)$.

$2x^3 - 5x + 3 - (3x^2 - 9)$

$2x^3 - 3x^2 - 5x + 12$

**2.** If $f(x) = -x^3 + 2x - 4$ and $g(x) = -3x^2 - 7$, find $f(x) \cdot g(x)$.

$(-x^3 + 2x - 4)(-3x^2 - 7)$

$3x^5 + 7x^3 - 6x^3 - 14x + 12x + 28$

$3x^5 + x^3 + 12x^2 - 14x + 28$

**3.** If $f(x) = x^3 + 9x^2 + 23x + 15$ and $g(x) = x + 5$, find $\frac{f(x)}{g(x)}$.

$$\begin{array}{r|cccc} -5 & 1 & 9 & 23 & 15 \\ & & -5 & -20 & -15 \\ \hline & 1 & 4 & 3 & 0 \end{array}$$

$x^2 + 4x + 3$

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**4.** Given $f(x) = x^2 + 6x - 1$ and $g(x) = x - 6$ find $f(g(8))$.

$g(8) = 8 - 6 = 2$

$f(2) = (2)^2 + 6(2) - 1$

$= \boxed{15}$

**5.** Find the composite function $f(g(x))$ given $f(x) = 2x^2 - x$ and $g(x) = 3x - 1$

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

$= 2(3x-1)(3x-1) - 3x + 1$

$= 2(9x^2 - 6x + 1) - 3x + 1$

$= 18x^2 - 12x + 2 - 3x + 1$

$\boxed{18x^2 - 15x + 3}$

**6.** Find the inverse of the following functions

**a.** $f(x) = 2x - 7$

$y = 2x - 7$

$x = 2y - 7$

$x + 7 = 2y$

$\frac{x+7}{2} = y$

$\boxed{f^{-1}(x) = \frac{x+7}{2}}$

**b.** $f(x) = \frac{3}{8}x + 5$

$y = \frac{3}{8}x + 5$

$x = \frac{3}{8}y + 5$

$x - 5 = \frac{3}{8}y$

$8x - 40 = 3y$

$\frac{8x-40}{3} = y$

$\boxed{f^{-1}(x) = \frac{8x-40}{3}}$

**c.** $f(x) = \sqrt{x+5}$

$y = \sqrt{x+5}$

$x = \sqrt{y+5}$

$x^2 = y + 5$

$x^2 - 5 = y$

$\boxed{f^{-1}(x) = x^2 - 5}$