Unit 2: Polynomial, Power, and Rational Functions
HW Packet #3 – Due 11/17/14

For questions 1-4, divide f(x) by d(x) and write your answer in polynomial form.

1.) $f(x) = 2x^3 - 7x^2 + 4x - 5; d(x) = x - 3$ 2.) $f(x) = x^4 + 3x^3 + x^2 - 3x + 3; d(x) = x + 2$

3.) $f(x) = 2x^4 - 3x^3 + 9x^2 - 14x + 7; d(x) = x^2 + 4$ 4.) $f(x) = 3x^4 - 5x^3 - 2x^2 + 3x - 6; d(x) = 3x + 1$

For questions 5-8, use the Rational Zeros Theorem to write a list of all potential rational zeros. Then, determine which ones, if any, are zeros of the function.

5.) $f(x) = 6x^3 - 5x - 1$

6.) $f(x) = 3x^3 - 7x^2 + 6x - 14$

7.) $f(x) = 2x^3 - x^2 - 9x + 9$

8.) $f(x) = 6x^4 - x^3 - 6x^2 - x - 12$

For questions 9-14, find all real zeros of the function, finding exact values wherever possible. Identify each zero as rational or irrational.

9.) $f(x) = x^3 + x^2 - 8x - 6$

10.) $f(x) = x^3 - 6x^2 + 7x + 4$

11.) $f(x) = x^4 - 3x^3 - 6x^2 + 6x + 8$

12.) $f(x) = x^4 - x^3 - 7x^2 + 5x + 10$

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

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

For questions 15-20, sketch a graph of the given rational function, analyze its end-behavior, identify its x-intercepts, y-intercepts, and its asymptotes.

15.) $f(x) = \frac{2x-1}{x+3}$

16.) $f(x) = \frac{3x-2}{x-1}$

17.) $f(x) = \dfrac{x-2}{x^2-2x-3}$

18.) $f(x) = \dfrac{2}{x^3-x}$

19.) $f(x) = \dfrac{2x^2+x-2}{x^2-1}$

20.) $f(x) = \dfrac{x+1}{x^2-3x-10}$

BONUS: Let $f(x) = 1 + \dfrac{1}{x-\frac{1}{x}}$ and $g(x) = \dfrac{x^3+x^2-x}{x^3-x}$. Does $f=g$? Support your answer by making a comparative analysis of all the features of f and g, including asymptotes, intercepts, and domain. (Attach additional paper for this one!)