Name: _____ Class: _____

Honors Pre-Calculus Homework Packet: UNIT 2 Polynomial, Power, and Rational Functions

2.1 and 2.2

Determine if the function is a polynomial. If it is, state the degree and leading coefficient.

1. $f(x) = 9 - 2x$

2. $f(x) = 3x^{-5} + 17$

3. $f(x) = 2x^5 - \frac{1}{2}x + 9$

Convert each quadratic function to vertex form to find the transformations. Then write the vertex and the axis of symmetry.

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

5. $f(x) = 8 + 2x - x^2$

6. $f(x) = 5x^2 - 25x + 1$

Write the statement as a power function. Use k for the constant of variation when it is not given.

7. The current I in an electrical circuit is inversely proportional to the resistance R, and constant of variation V.

8. The energy E produced in a nuclear reaction is directly proportional to the mass m, with the constant of variation being c^2, the square of the speed of light.

9. The speed, p of a free-falling object that has been dropped from rest varies directly as the square root of the distance traveled d, with a constant of variation $k = \sqrt{2g}$

2.3

State the degree of each polynomial, then write out all of the zeroes and their multiplicities.

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

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

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

4. $f(x) = -6(x + 5)^3(x - 4)^2(5x + 3)$

Graph each polynomial function.

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

6. $f(x) = x(x + 3)^5(x - 2)^3$

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

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

Write the polynomial function with the given zeroes in factored form and standard form.

9. Zeros: $-2, 3, -5$

10. Zeros: $4 \, m. 2, \; 1 \pm \sqrt{2}$

2.4

Use long division to divide the polynomials. Write out the quotient and remainder.

1. $x^4 - 2x^3 + 3x^2 - 4x + 6 \div x^2 + 2x - 1$

2. $x^6 + 2x^5 + 5x^3 + 4x^2 + 6 \div x^3 + 2$

Use synthetic division to divide the polynomials. Write out the quotient and remainder.

3. $2x^4 - 5x^3 + 7x^2 - 3x + 1 \div x - 3$

4. $3x^5 - 5x^3 + 4x^2 - 15x - 3 \div x + 2$

Find the remainder after each polynomial is divided.

5. $x^3 - 3x + 4 \div x + 2$

6. $x^5 - 2x^4 + 3x^2 - 20x + 3 \div x + 1$

7. $x^3 - x^2 - x - 15 \div x - 3$

Use the Rational Zeroes Theorem to write a list of all the potential rational zeros. Then determine which ones are actual zeroes.

8. $f(x) = 2x^3 - 5x^2 - x + 6$

2.5 and 2.6

Write the polynomial in standard form.

1. $f(x) = (x + 2)(x - \sqrt{3}i)(x + \sqrt{3}i)$

2. $f(x) = x(x + 1)(x - 1 - i)(x - 1 + i)$

Write the polynomial function with the given zeros in factored form and standard form.

3. Zeros: $1 - 2i \text{ and } 1 + 2i$

4. Zeros: $-1, 2, \text{ and } 1 - i$

5. Zeros: $3 + 4i, \text{ and } 2 - 7i$

Given one zero of the polynomial, find the rest of the zeros of the polynomial.

6. $4i \text{ is a zero of } f(x) = x^4 + 13x^2 - 48$

7. $2 \text{ is a zero of } f(x) = x^3 - 6x^2 + 13x - 10$

8. $1 + 3i \text{ is a zero of } f(x) = x^4 - 2x^3 + 5x^2 + 10x - 50$

2.9

Determine where the function is (a) < 0, (b) ≤ 0, (c) > 0, and (d) ≥ 0

1. $f(x) = (x - 7)(3x + 1)(x + 4)$

2. $f(x) = (5x + 3)(x + 6)^2(x - 1)$

Solve the inequality.

3. $(2x + 1)(x - 2)(3x - 4) \leq 0$

4. $(2x - 7)\sqrt{x + 4} > 0$

5. $\frac{(x+3)}{|x-8|} \geq 0$

Determine where the function is (a) < 0, (b) ≤ 0, (c) > 0, and (d) ≥ 0

6. $f(x) = \frac{(2x-7)(x+1)}{x+5}$

7. $f(x) = \frac{\sqrt{x+5}}{(2x+1)(x-1)}$

8. $f(x) = \frac{3x-1}{(x+3)\sqrt{x-5}}$

9. $f(x) = \frac{(x-5)|x-2|}{\sqrt{2x-3}}$

10. $f(x) = \frac{x^2(x-4)^3}{\sqrt{x+1}}$