Algebra 2
Unit 5 - Higher Order Polynomials
Review Assignment

Name: Mrs. MacDonald

1.) Simplify the following using rules of exponents.

a.) $x^3x^4 = x^7$ b.) $(x^3)^2 = x^6$ c.) $\frac{x^7}{x^4} = x^3$ d.) $(2x^3)^2 = 4x^6$

e.) $\frac{x^{-2}}{yx^3} = \frac{1}{yx^5}$ f.) $\frac{x^4y^{-2}}{x^5y^5} = \frac{1}{xy^7}$ g.) $(3^2x^0y^4)^3 = 3^6y^{12}$ $729y^{12}$ h.) $\frac{4x^3y^{-1}}{2x^{-2}y^{-4}} = 2x^5y^3$

2.) Are the following polynomials? Write yes/no and provide a reason.

a.) $g(x) = x^3 + 2x^2 - 5x$ yes

b.) $f(x) = \frac{x^2}{3^x}$ no, x in the exponent

c.) $h(x) = x^4 - 2x + 2$ yes

d.) $h(x) = x^{-3} - 2x + 7$ no, negative exponent

3.) Write the definition for the words below. Use the example to describe the polynomial.

DEFINITIONS	**(Ex) $f(x) = -5x^5 - 3x^3 + 4x^2 - x + 12$**
• Degree: highest exponent	5
• Lead Coefficient: number in front of 1st term	-5
• # of Terms: monomials separated by + or -	5
• # of Possible Zeros: same as the degree	5
• # of Turns: one less than degree	4
• Left End behavior: direction left side of graph	↑
• Right End behavior: direction right side of graph	↓
• Constant: last term with no variable	12

4.) Multiply the following polynomials.

a.) $(x-3)(x+2)$

$x^2+2x-3x-6$

$\boxed{x^2-x-6}$

b.) $(x-1)(x^2-7x+4)$

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

$\boxed{x^3-8x^2+11x-4}$

c.) $(x+3)(x-2)(x+2)$

$(x^2-2x+3x-6)(x+2)$

$(x^2+x-6)(x+2)$

$x^3+2x^2+x^2+2x-6x-12 = \boxed{x^3+3x^2-4x-12}$

d.) $(x+5)^2$

$(x+5)(x+5)$

$x^2+5x+5x+25$

$\boxed{x^2+10x+25}$

5.) Perform the operations on the following polynomials.

a.) $-2(5x^4-3x^3+4x^2-x+12)-3(x^4-2x^3+x^2-7x+5)$

$-10x^4+6x^3-8x^2+2x-24-3x^4+6x^3-3x^2+21x-15$

$\boxed{-13x^4+12x^3-11x^2+23x-39}$

b.) $(9x^4-2x^3+x^2-16x+2)+2(x^4-3x^3+2x^2-9x+10)$

$9x^4-2x^3+x^2-16x+2+2x^4-6x^3+4x^2-18x+20$

$\boxed{11x^4-8x^3+5x^2-34x+22}$

6.) Use synthetic division to solve the following polynomials.

a.) $5x^3+21x^2-21x-5$ using $(x+5)$

$-5 \mid 5 \quad 21 \quad -21 \quad -5$

$\downarrow \quad -25 \quad +20 \quad +5$

$5 \quad -4 \quad -1 \quad \boxed{0}$

$5x^2-4x-1$ ← no remainder

b.) $x^3-x^2-22x+40$ using $(x-4)$

$4 \mid 1 \quad -1 \quad -22 \quad 40$

$\downarrow \quad +4 \quad +12 \quad -40$

$1 \quad 3 \quad -10 \quad \boxed{0}$ ← no remainder

$x^2+3x-10$

7.) Simplify the following.

a.) $\frac{6x^5y^2+8x^7y^4-4x^2y^1}{2x^5y^5}$

$\frac{6x^5y^2}{2x^5y^5}+\frac{8x^7y^4}{2x^5y^5}-\frac{4x^2y^1}{2x^5y^5}$

$\frac{3}{y^3}+\frac{4x^2}{y}-\frac{2}{x^3y^4}$

b.) $\frac{3x^2y^6+10x^7y^6-12x^{12}y^9}{2xy^4}$

$\frac{3x^2y^6}{2xy^4}+\frac{10x^7y^6}{2xy^4}-\frac{12x^{12}y^9}{2xy^4}$

$\frac{3xy^2}{2}+5x^6y^2-6x^{11}y^5$

.) Factor these cubic polynomials. (Hint: Find a & b FIRST!)

a.) $x^3 - 27 =$ $a=x$ $b=3$ $(x-3)(x^2+3x+9)$

b.) $8x^3 + 64 =$ $a=2x$ $b=4$ $(2x+4)(4x^2-8x+16)$

c.) $125x^3 - 1 =$ $a=5x$ $b=1$ $(5x-1)(25x^2+5x+1)$

9.) Factor & solve these using Factor by Grouping.

a.) $(x^3 - 3x^2) + (6x - 18) = 0$

$x^2(x-3)+6(x-3)=0$

$(x-3)(x^2+6)=0$

$x-3=0$ $\quad x^2+6=0$

$\boxed{x=3}$ $\quad x^2=-6$

$\boxed{x=\pm i\sqrt{6}}$

b.) $(x^3 - 4x^2) + (4x + 16) = 0$

$x^2(x-4)-4(x-4)=0$

$(x-4)(x^2-4)=0$

$(x-4)(x-2)(x+2)=0$

$x-4=0$ $\quad x-2=0$ $\quad x+2=0$

$\boxed{x=4}$ $\quad \boxed{x=2}$ $\quad \boxed{x=-2}$

c) $(x^3 + 2x^2) - (9x - 18) = 0$

$x^2(x+2)-9(x+2)=0$

$(x+2)(x^2-9)=0$

$(x+2)(x+3)(x-3)=0$

$x+2=0$ $\quad x+3=0$ $\quad x-3=0$

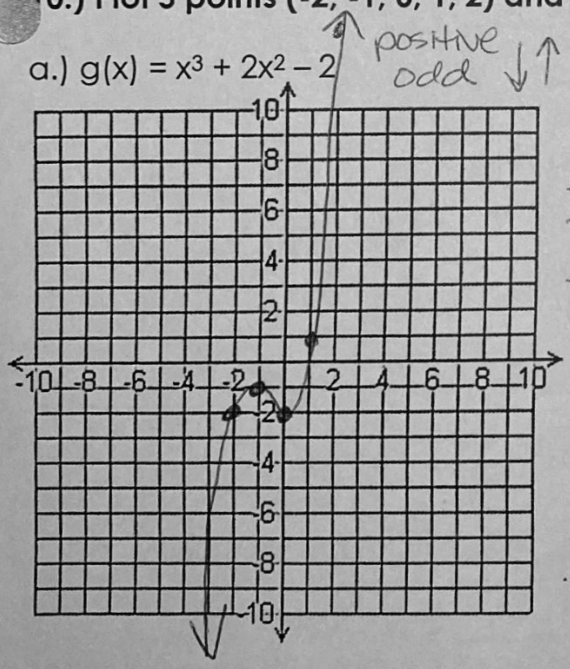
$\boxed{x=-2}$ $\quad \boxed{x=-3}$ $\quad \boxed{x=3}$

Graph the following polynomials

10.) Plot 5 points (-2, -1, 0, 1, 2) and use end behavior.

a.) $g(x) = x^3 + 2x^2 - 2$ positive odd ↓↑

x	y
-2	-2
-1	-1
0	-2
1	1
2	14



b.) $g(x) = -x^4 + x + 3$ negative even ↓↓

x	y
-2	-15
-1	1
0	3
1	3
2	-11