**Algebra2 Test Study Notes**

**Unit 6 – Polynomial Functions**

Polynomials

* A polynomial is the sum or difference of monomials
* Add like terms in polynomials, like terms have the same exponents on the same variables
* When subtracting polynomials be careful to distribute the subtraction to every term

Multiplying Polynomials

* When multiplying binomials, use FOIL
* Groups with more than two terms, distribute the entire other group to each term
* Expanding binomials
	+ Use Pascal’s triangle for the coefficients of the terms
	+ Each variable steps down in exponent from opposite directions
	+ Variables start with exponent that matches the exponent in the question
	+ Be careful to raise constants to the exponent

Dividing Polynomials

* Long division can always be used (be sure to subtract all terms from the dividend
* Synthetic division only works with a variable coefficient of one
	+ Change the sign on the constant
	+ Only write the coefficients in the dividend
	+ Drop the first coefficient down, then multiply with divisor and list below next term
	+ Add terms without changing signs, the last number is the remainder
* Remainder Theorem – Remainder of a division is the value of the polynomial with the variable replaced by the divisor

Factoring Polynomials

* Division can be used to test for factors
* Four terms may be factored with grouping
* Know sum and difference of squares
	+ $\left(a-b\right)^{2}=a^{2}-2ab+b^{2}$ ; $\left(a+b\right)\left(a-b\right)=a^{2}-b^{2}$
* Know sum and difference of cubes
	+ $a^{3}-b^{3}=\left(a-b\right)\left(a^{2}+ab+b^{2}\right)$ ; $a^{3}+b^{3}=\left(a+b\right)\left(a^{2}-ab+b^{2}\right)$

Roots of Polynomial Equations

* Roots are the zeros of the graph, where the graph crosses the x-axis
* A factor raised to a power is a multiplicity, and may cross or just touch the x-axis
* All possible real roots occur when the values of the last term’s factors divided by the first term’s factors when the polynomial is in standard form.
	+ Make a list of possible factors
	+ Use synthetic division to test each possible factors
	+ Roots result in a remainder of zero
	+ Rewrite the polynomial after a factor is found, and solve in simplest method

Fundamental Theorem of Algebra

* Every polynomial has as many possible roots as its highest degree
* Imaginary roots always are in pairs, complex conjugates

Graphs of Polynomial Functions

* A graph can turn up to one time less than its highest degree
* Know the basic shape of graphs through the fourth power
* End Behavior, based on degree and sign of leading coefficient
	+ Even degrees both go the same direction, positive is both up, negative is both down
	+ Odd degrees go in opposite directions, positive us up on the right negative is down on the right

Graphing calculators may not be used on the test