College Algebra Course Objectives – updated Spring Semester 2017

1. Use algebraic methods to solve a variety of problems involving exponential, logarithmic, polynomial, and rational functions, systems of equations and inequalities, sequences.
2. Solve equations by correctly completing several logical steps before arriving at a final answer, and when possible, check solutions.
3. Graph linear, power, root, reciprocal, absolute value, polynomial, rational, exponential, logarithmic functions using basic transformations.
4. Graph solution sets of systems of inequalities.
5. Use mathematical vocabulary and symbols in order to understand, interpret, and represent mathematical information.
6. Use algebraic manipulations to rewrite equations and expressions, including rewriting in standard form, factoring, completing the square and converting systems of equations to either a matrix equation or augmented matrix form.

Chapter 2 Functions

A student is able to:

1. State the definition of a function. (2.1, 2.2)
2. Determine when an equation represents a function. (2.2)
3. Use the vertical line test to determine when the graph of an equation represents a function. (2.2)
4. Demonstrate proper function notation. (2.1, 2.2)
5. Find the domain of a function from the equation and from the graph. (2.1, 2.3)
6. Find the range of a function from a graph. (2.3)
7. Evaluate a function at a point. (2.1, 2.3)
8. Compute the difference quotient for a variety of types of functions. (2.1, 2.4)
9. Discuss even and odd symmetry of functions. (2.6)
10. Understand the terms: increasing, decreasing, and constant as they relate to functions. (2.3)
11. Recognize the graphs of linear, power, root, reciprocal and absolute value functions. (2.2)
12. Sketch graphs of simple functions by plotting points. (2.2, 2.3)
13. Use transformations to sketch the graphs of linear, power, root, reciprocal and absolute value functions. (2.6)
14. Determine formulas for the sum, difference, product, quotient and composition of functions. (2.7)
15. Determine the domain of a function which is the sum, difference, product, quotient or composition of functions. (2.7)
16. Find the inverse of a function formally (algebraically) and graphically. (2.8)
17. Understand the definition of one-to-one and its relationship to inverse functions. (2.8)
18. Determine and interpret the net change and the average rate of change of a function on an interval [a,b]. (2.4)
19. Graph and interpret a piecewise defined function. (2.1)
20. Compute the difference quotient for linear, quadratic, radical, and rational functions. (2.1)
Chapter 3: Polynomial and Rational Functions

A student is able to:

1. Complete the square to put a quadratic function into standard form. (3.1)
2. Find the vertex and max/min values of a quadratic function. (3.1)
3. Graph a polynomial, showing x- and y-intercepts and proper end behavior. (3.1, 3.2)
4. Perform long division on polynomials. (3.3)
5. Perform synthetic division on polynomials. (3.3)
6. Use the Remainder Theorem to evaluate a polynomial. (3.3)
7. Use the Factor Theorem to find a factor of a polynomial. (3.3, 3.4)
8. Construct a polynomial given the zeros and their multiplicities. (3.3)
9. Use the Rational Zeros Theorem, Descartes’ Rule of Signs, and the Upper and Lower Bounds Theorem in finding zeros of polynomials. (3.4)
10. Solve polynomial equations. (3.2, 3.3, 3.4, 3.5)
11. Factor a polynomial into linear and/or irreducible quadratic factors. (3.2, 3.3, 3.4)
12. Factor a polynomial into linear factors, using complex coefficients when necessary. (3.2, 3.4, 3.5)
13. Find vertical, horizontal, and slant asymptotes of rational functions. (3.6)
14. Graph a rational function, showing intercepts and asymptotes. (3.6)
15. State the Fundamental Theorem of Algebra. (3.5)

Chapter 4: Exponential and Logarithmic Functions

A student is able to:

1. Graph exponential and logarithmic equations. (4.1, 4.2, 4.3)
2. Solve interest problems using the compound interest formula: \( A = P \left(1 + \frac{r}{n}\right)^{nt} \) and the continuous interest formula: \( A = Pe^{rt} \). (4.1, 4.2, 4.5)
3. Switch between exponential and logarithmic forms using the definition of logarithm: \( y = b^x \leftrightarrow \log_b{y} = x \). (4.3, 4.4, 4.5)
4. Use the properties of logarithms to combine or expand logarithmic expressions. (4.3, 4.4, 4.5)
5. Use the change of base formula for logarithms. (4.4, 4.5)
6. Solve logarithmic and exponential equations. (4.3, 4.4, 4.5, 4.6)
7. Solve applied exponential and logarithmic problems using base 10 and base e such as; pH, exponential growth and decay. (4.5, 4.6)
Chapter 5: Systems of Equations and Inequalities

A student is able to:

1. Solve a system of equations by substitution/elimination. (ch 5)
2. Solve a system of nonlinear equations in two variables. (ch 5)
3. Solve a system of linear equations in three variables. (ch 5)
4. Write the solutions of a linear system of equations with infinitely many solutions. (ch 5)
5. Graph the solution set of a system of inequalities. (5.5)
6. Use Linear Programming to solve a problem. (ch 5 extra topic)
7. Compute the partial fraction decomposition of a rational function when the denominator is a product of linear factors or distinct quadratic factors. (5.3)

Chapter 6: Matrices and Determinants

A student is able to:

1. Write a system of linear equations as a matrix equation. (6.1)
2. Write a matrix equation as a system of equations. (6.1)
3. Add and multiply two matrices. (6.2)
4. Use Gauss-Jordan elimination to solve a system of equations. (6.3)
5. Recognize if a matrix is in (reduced) row-echelon form. (6.3)
6. Compute the determinant of a 2x2 or 3x3 matrix. (6.4)
7. Compute the inverse of a 2x2 or 3x3 matrix. (6.3, 6.4)
8. Solve a system of equations using an inverse matrix. (6.3)
9. Use Cramer's rule to solve a 2x2 or 3x3 system of equations. (6.4)

Chapter 8: Sequences and Series

A student is able to:

1. Find terms of a sequence given a formula for the general term. (8.1)
2. Find a formula for the nth term of a general sequence given several terms. (8.1)
3. Use a recursion formula to find terms of a sequence. (8.1)
4. Calculate the common difference for an arithmetic sequence. (8.2)
5. Find a formula for the nth term of an arithmetic sequence given several terms. (8.2)
6. Calculate the common ratio for a geometric sequence. (8.3)
7. Find a formula for the nth term of a geometric sequence given several terms. (8.3)
8. Find the nth partial sum of an arithmetic or geometric sequence. (8.2)
9. Calculate the sum of an infinite geometric series. (8.3)
10. Use Pascal’s Triangle to expand a binomial. Use the Binomial Theorem to expand a binomial. (8.6)
11. Find a particular term of a binomial expansion. (8.6)