

FIRST SEMESTER

ACC Math 2 – Unit 1 – Modeling with Matrices

MA2A6. Students will perform basic operations with matrices.

- a. Add, subtract, multiply, and invert matrices, when possible, choosing appropriate methods, including technology.
- b. Find the inverses of two-by-two matrices using pencil and paper, and find inverses of larger matrices using technology.
- c. Examine the properties of matrices, contrasting them with properties of real numbers.

MA2A7. Students will use matrices to formulate and solve problems.

- a. Represent a system of linear equations as a matrix equation.
- b. Solve matrix equations using inverse matrices.
- c. Represent and solve realistic problems using systems of linear equations.

MA2A8. Students will solve linear programming problems in two variables.

- a. Solve systems of inequalities in two variables, showing the solutions graphically.
- b. Represent and solve realistic problems using linear programming.

MA2A9. Students will understand and apply matrix representations of vertex-edge graphs.

- a. Use graphs to represent realistic situations.
- b. Use matrices to represent graphs, and solve problems that can be represented by graphs.

ACC Math 2 – Unit 2 – Inverse, Polynomial, and Exponential Functions

MA2A2. Students will explore inverses of functions.

- a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.
- b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = a/x$, including the use of restricted domains.
- c. Explore the graphs of functions and their inverses.
- d. Use composition to verify that functions are inverses of each other.

MA2A3. Students will analyze graphs of polynomial functions of higher degree.

- a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.
- b. Understand the effects of the following on the graph of a polynomial function: degree, lead coefficient, and multiplicity of real zeros.
- c. Determine whether a polynomial function has symmetry and whether it is even, odd, or neither.

MA2G5. Students will investigate planes and spheres.

- a. Plot the point (x, y, z) and understand it as a vertex of a rectangular prism.
- b. Apply the distance formula in 3-space.

ACC Math 2 – Unit 3 – Statistics

MA2D1. Using sample data, students will make informal inferences about population means and standard deviations.

- a. Pose a question and collect sample data from at least two different populations.
- b. Understand and calculate the means and standard deviations of sets of data.
- c. Use means and standard deviations to compare data sets.
- d. Compare the means and standard deviations of random samples with the corresponding population parameters. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.

ACC Math 2 – Unit 4 – Right Triangle Trigonometry

MA2G1. Students will identify and use special right triangles.

- a. Determine the lengths of sides of 30° - 60° - 90° triangles.
- b. Determine the lengths of sides of 45° - 45° - 90° triangles.

MA2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.

- a. Discover the relationship of the trigonometric ratios for similar triangles.
- b. Explain the relationship between the trigonometric ratios of complementary angles.
- c. Solve application problems using the trigonometric ratios.

SECOND SEMESTER

ACC Math 2 – Unit 5 – Exponential and Logarithmic Functions

MA2A1. Students will explore exponential functions.

- a. Extend properties of exponents to include all integer exponents.
- b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.
- c. Graph functions as transformations of $f(x) = a^x$.
- d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.
- e. Understand and use basic exponential functions as models of real phenomena.
- f. Understand and recognize geometric sequences as exponential functions with domains that are sets of whole numbers.
- g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.

MA2A4. Students will explore logarithmic functions as inverses of exponential functions.

- a. Define and understand the properties of n^{th} roots.
- b. Extend properties of exponents to include rational exponents.
- c. Define logarithmic functions as inverses of exponential functions.
- e. Investigate and explain characteristics of exponential and logarithmic functions including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, and rate of change.
- f. Graph functions as transformations of $f(x) = a^x$, $f(x) = \log_a x$, $f(x) = e^x$, $f(x) = \ln x$.
- g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.

ACC Math 2 – Unit 6– Solving Equations and Inequalities

MA2A4. Students will explore logarithmic functions as inverses of exponential functions.

- d. Understand and use properties of logarithms by extending laws of exponents.
- g. Explore real phenomena related to exponential and logarithmic functions including half-life and doubling time.

MA2A5. Students will solve a variety of equations and inequalities.

- a. Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.

- b. Solve polynomial, exponential, and logarithmic equations analytically, graphically, and using appropriate technology.
- c. Solve polynomial, exponential, and logarithmic inequalities analytically, graphically, and using appropriate technology. Represent solution sets of inequalities using interval notation.
- d. Solve a variety of types of equations by appropriate means choosing among mental calculation, pencil and paper, or appropriate technology.

ACC Math 2 – Unit 7–Conics

MA2G3. Students will investigate the relationships between lines and circles.

- a. Find equations of circles.
- b. Graph a circle given an equation in general form.
- c. Find the equation of a tangent line to a circle at a given point.
- d. Solve a system of equations involving a circle and a line.
- e. Solve a system of equations involving two circles.

sections (parabolas, circles, ellipses, and hyperbolas).

- a. Convert equations of conics by completing the square.
- b. Graph conic sections, identifying fundamental characteristics.
- c. Write equations of conic sections given appropriate information.

MA2G5. Students will investigate planes and spheres.

- c. Recognize and understand equations of planes and spheres.

ACC Math 2 – Unit 8– Data Analysis

MA2D2. Students will create probability histograms of discrete random variables, using both experimental and theoretical probabilities.

MA2D3. Students will solve problems involving probabilities by interpreting a normal distribution as a probability histogram for a continuous random variable (z-scores are used for a general normal distribution).

- a. Determine intervals about the mean that include a given percent of data.
- b. Determine the probability that a given value falls within a specified interval.
- c. Estimate how many items in a population fall within a specified interval.

MA2D4. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.