FIRST SEMESTER

Math 3 – Unit 1 – Modeling With Matrices

MM3A4. 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.

MM3A5. 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. **MM3A6. 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.
MM3A7. 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.

Math 3 – Unit 2 – Polynomial Functions

MM3A1. 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.
d. Investigate and explain characteristics of polynomial functions, including domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.
MM3G3. 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.

Math 3 – Unit 3 – Logarithmic and Exponential Functions

MM3A2. 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.

SECOND SEMESTER

Math 3– Unit 4 – Solving Equations and Inequalities

MM3A2. 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.

MM3A3. 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.

Math 3 – Unit 5 –Conics

MM3G1. 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.

MM3G2. Students will recognize, analyze, and graph the equations of the conic 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.

MM3G3. Students will investigate planes and spheres.

c. Recognize and understand equations of planes and spheres.

Math 3 – Unit 6 – Data Analysis

MM3D1. Students will create probability histograms of discrete random variables,

using both experimental and theoretical probabilities.

MM3D2. 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.

MM3D3. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.