MATH 117: Final Review Outline

Instructor: Joseph McGuire

So first off the exam will be due: **December 4 @ 11:59pm**. I will also be **not accepting late work for this exam**. The final will be worth 200 points and have 10 questions on it (likely with multiple parts), as per the syllabus the final exam will contribute 25% to your final grade. So get started on this as soon as possible and ask questions when you need to. I expect excellent work from you all, good luck!

The exam will be posted November 30 @ 8 am.

Following these steps in studying for the final will likely lead to a good result:

1. Do the sample exam

2. Come to office hours with questions

3. Redo previous homework's

4. Come to office hours with questions

5. Redo the sample exam

For studying for the final, I would highly recommend reviewing, being familiar with, and being able to apply the following concepts:

- Polynomial Division

    - Be able to divide two polynomials
    - Be able to recognize what the remainder of the polynomial tells you about the roots of the polynomial

- Polynomial End Behavior

    - Just given the degree of a polynomial, be able to figure out the end behavior of it

- Polynomial Theorems

    - Remainder Theorem
    - Rational Roots Theorem
    - Descartes' Rule of Signs
    - Fundamental Theorem of Algebra

- Conjugate Roots Theorem

- Graphing Polynomials

  - Know what it means for the graph of a polynomial, for that polynomial not to have any real roots.

- Rational Functions

  - Know how to find the end behavior of a rational function
  - Know how to find the vertical asymptotes of a rational function
  - Know how to find the horizontal asymptotes of a rational function
  - Know how to find the roots of a rational function

- Inequalities

  - Know how to use the tools we have for polynomials to find where an inequality involving two polynomials is true
  - Know how to use the tools we have for polynomials to find where an inequality involving two rational functions is true

- Graphs of Exponential Functions

  - Know what the graph of a^x will look like for any $a > 0$

- Compound Interest

  - Know we derived the constant e using the compound interest formula
  - Know the formula $A(t) = P\left(1 + \dfrac{r}{n}\right)^{nt}$ and what all the constants represent
  - Know the formula $A(t)Pe^{rt}$ and what all the constants represent
  - Know to use both the continuously compounded interest formula and the general compounded interest formulas listed above.

- Logarithmic Equations

  - Know how to convert from the logarithmic form of an equation to the exponential form of the equation.
  - Know $\log_a(1) = 0$, $\log_a(a) = 1$, $\log_a(a^x) = x$ and $a^{\log_a(x)} = x$
  - Know all of the Laws of Logarithms we have gone over, that is the product law, the quotient law, and the power law.
  - Know the Change of Base formula

- Exponential Modeling

  - Know the exponential growth models $n_0 e^{rt}$ and $n_0 2^{t/h}$ and the constants in each model.

- Know the radioactive decay models $m_0 e^{-rt}$ and $m_0 2^{-t/h}$ and the constants in each model.
- Know Newton's Law of Cooling $T_s + D_0 e^{-kt}$ and all of the constants involved in the model.

- Systems of Linear Equations

  - Know how to solve these using:
    * Substitution/Elimination Method
    * Gaussian + Jordan/Gaussian Elimination
    * Cramer's Rule
    * Matrix Equations

- Number of Solutions to a System of Linear Equations

  - Know how to determined whether a system of linear equations in inconsistent, dependent, or has a unique solution
  - Know how to write out a dependent systems solutions in terms of a parameter t
  - Know how to solve a system of 3 linear equations that has 2 parameters s and t

- Matrix Operations

  - Know how to
    * Add two matrices
    * Subtract two matrices
    * Multiply by a constant
    * Multiply two matrices together
    * Find the Inverse of a 2×2 matrix
    * Find the Inverse of a 3×3 matrix

- Determinants of a Matrix

  - Using cofactors and minors, know how to find the determinant of a 3×3 matrix
  - Know the formula for the determinant of a 2×2

- Applications of Matrix Operations

  - Know how to use the determinant of a Matrix to use Cramer's Rule on a system of 2 linear equations
  - Know how to use the determinant of a Matrix to solve for the area of a triangle, given three points that define the triangle in the plane