MATH 111I Review Sheet Final Exam: 7 December 2016 in LeConte 112, 4:00pm-6:30pm

For the final exam, you should be comfortable with / be able to do all of the following things:

- The sets \mathbb{Z}, \mathbb{Q} , and \mathbb{R}
- Membership of a set \in
- Graphing intervals and discrete sets on a number line
- Interval notation
- Set unions and intersections
- Notation for the empty set
- Number comparisons $=, \leq, <, \geq, >$
- The absolute value function
- Integer, fractional, and negative exponents
 - evaluated at particular values
 - added and subtracted
 - multiplied and divided
 - raised to exponents
- Evaluating an expression at particular values of a variable
- Expanding expressions
- The distributive property
- Combining like terms
- Factoring out a common factor
- Factoring quadratics
 - with leading coefficient 1
 - with leading coefficient other than 1
- Factoring by grouping
- Difference of squares

- Combining rational expressions
- Simplifying rational expressions
- Identifying the domain of rational expressions
- Identifying linear equations
- Solving linear equations
- Solving equations involving one power of a variable
- Solving linear inequalities
- Finding the first difference in a set of data
- Net change of a function over an interval
- Identifying linear data from information presented in
 - a formula
 - a chart
 - a graph
 - English words
- Modeling linear data from information presented in
 - a chart
 - a graph
 - English words
- Identifying a function when presented as
 - a list of points
 - a graph
 - a formula
 - English words
 - an arrow diagram
- The vertical line test
- Interpreting inputs and outputs of a function in a given context
- Evaluating a function at a particular value
- Identifying domain and range of a function
- Evaluating piecewise functions at a point

- Graphing piecewise linear or simple quadratic functions
- Identifying the domain and range of a function given
 - a list of points
 - a graph
 - a formula
- Using English descriptions to model basic geometric relationships including:
 - perimeter of
 - * rectangle
 - * circle
 - * right triangle
 - area of
 - * circle
 - * square
 - * rectangle
 - * triangle
 - volume of
 - * cube (box)
 - * cylinder with square base (box)
 - * cylinder with rectangular base (box)
 - * cylinder with circular base
 - * cylinder with triangular base
- Solve quadratic equations by factoring
- Solve quadratic equations by utilizing the quadratic formula
- Calculate the average rate of change of a function over an interval from information given in
 - a list of points
 - a chart
 - a graph
 - a formula
 - English words
- Average rate of change of a line
- Graphing linear functions

- Slope-intercept form
- Point-slope form
- Converting between units
- Identifying direct proportionality
- Solving systems of linear equations by
 - graphing
 - substitution
- Identifying and creating perpendicular lines
- Identifying and creating parallel lines
- Identifying exponential growth when presented in
 - English words
 - a graph
 - the form Ca^x
 - the form $C(1+r)^x$
 - the form Ce^{kx}
- Identifying exponential decay when presented in
 - English words
 - a graph
 - the form Ca^x
 - the form $C(1+r)^x$
 - the form Ce^{kx}
- Creating exponential models
- Graphs of exponential functions
- Distinguishing exponential functions from linear functions
- Percentage rate of change
- Finding
 - initial values
 - growth/decay factor
 - growth/decay rate

- instantaneous growth/decay factor
- growth/decay factor
- Comparing rates in exponential models
- Changing timescales of exponential models
- Composition of functions
- Inverse functions
 - the horizontal line test
 - finding inverse functions
 - utilizing inverse functions to solve equations
- Logarithms
 - the relationship between logarithm and exponential functions
 - $-\log_b(x)$
 - Evaluating logarithms at a value
 - Graphs of logarithmic functions
- Logarithm laws including
 - Logarithm of a power
 - Logarithm of a product
 - Logarithm of 1
 - Change of base formula
- Simplifying logarithmic expressions
- The number e
- The natural logarithm
- Solving equations involving exponential and logarithmic functions
- Finding the doubling time or half life of a scenario
- Converting between Ca^x , $C(1+r)^x$, and Ce^{kx}
- Transformations of a graph, including
 - vertical shifting, stretching, and shrinking
 - horizontal shifting stretching, and shrinking
 - graphs of transformations of functions

- evaluating a transformation of a function at a point
- Standard and vertex form of a quadratic function
 - Changing vertex form into standard form
 - Changing standard form into vertex form (completing the square)
- Graphs of quadratic functions
- Finding the vertex of a parabola given
 - a graph
 - a function in standard form
 - a function in vertex form
 - a function which has been factored
 - a description of a transformation of the function $f(x) = x^2$
- Modeling quadratic equations
- Interpreting quadratic formulas
- Maximizing and minimizing quadratic equations given
 - a graph
 - $-\,$ a formula
 - English words

As well as a standard familiarity with

- Basic arithmetic with integers
- Properties of real numbers, including 0 and 1
- Arithmetic with negative numbers
- Adding, subtracting, multiplying, dividing reasonable fractions
- Adding, subtracting, multiplying, dividing reasonable decimals
- Units of measurement
- Reasonable approximation and rounding rules
- The concept of mathematical equality and equivalence