

FINAL EXAM MATERIAL AND EXPECTATIONS

For the final exam, you should be able to do the following things:

Chapter 1.

- Use the midpoint and distance formulas for points in the xy -plane
- Write the equation of a circle when you're given the center and radius
- Find the center and radius of a circle when you're given an equation for it
- Find equations of lines satisfying certain conditions, such as:
 - a line through a point (x_1, y_1) with slope m
 - a line through points (x_1, y_1) and (x_2, y_2)
 - a line through a point (x_1, y_1) that is parallel to $y = mx + b$
 - a line through a point (x_1, y_1) that is perpendicular to $y = mx + b$
- Solve quadratic equations by factoring or using quadratic formula
- Use the quadratic formula to find complex solutions of a quadratic
- Solve equations of quadratic type
- Solve equations with rational expressions or radicals
- Solve linear inequalities
- Solve quadratic inequalities
- Solve linear absolute value equations and inequalities

Chapter 2.

- Express a function through a formula
- Plug in numbers and algebraic expressions into a formula for a function
- Find the domain of a function
- Use the vertical line test to determine if a curve is the graph of a function
- Make a table of values for a function and plot the points to sketch the graph
- Use the graph of a function to find:
 - domain and range
 - intervals where f is positive and where f is negative
 - intervals where f is increasing and where f is decreasing
 - local maxima and local minima of f
- Find the average rate of change of a function between two points
- Use the graph of $y = f(x)$ and graph transformations to sketch a graph of $y = Af(Bx + C) + D$
- Find the formula for $f \circ g$ given the formulas for f and g
- Use the horizontal line test to determine if a function is one-to-one
- Find the formula for $f^{-1}(x)$ from the formula for $f(x)$

Chapter 3.

- Put a quadratic function in standard form by completing the square
- Find the vertex of a quadratic function
- Find the maximum or minimum value of a quadratic function and know difference between max or min
- Use the degree and the leading coefficient to determine end behavior of a polynomial
- Use the multiplicity of a zero of a polynomial to determine the behavior of the graph near the zero
- Sketch a graph of a polynomial based on its zeros, their multiplicities, and the end behavior
- Find the quotient and remainder of a division of polynomials
- Use the Factor Theorem to factor higher-degree polynomials by knowing one or more of the zeros
- Use the Factor Theorem to construct a polynomial that has certain given zeros
- Find zeros of a rational function
- Find vertical asymptotes of a rational function
- Determine behavior of the function near each vertical asymptote on either side
- Find horizontal asymptote of a rational function by comparing leading terms of numerator and denominator
- Solve inequalities with rational functions and higher-degree polynomials

Chapter 4.

- Evaluate values of exponential functions and recognize their graphs
- Display understanding of logarithms by translating equations between exponential form and logarithmic form
- Evaluate values of logarithmic functions and recognize their graphs
- Find the domain of functions involving logarithms
- Use the change of base formula to write logarithms of other bases in terms of \ln
- Use the log laws to expand out logarithmic expressions into smaller pieces
- Use the log laws to write a sum of multiples of logs as a single log
- Solve exponential and logarithmic equations

Chapter 5.

- Draw an angle in standard position
- Given an angle in radians, convert to degrees
- Given an angle in degrees, convert to radians
- Find angles coterminal to a given angle
- Find the reference angle of a given angle
- Given two sides of a right triangle, use the Pythagorean Theorem to find the third side
- Given two sides of a right triangle, compute the six trigonometric ratios of one of the acute angles, and use inverse trig functions to compute the measure of the angle
- Given one side and an acute angle of a right triangle, use the trig ratios to find the other sides
- Find the sign of a trig function based on the quadrant
- Use the Law of Sines or Law of Cosines to solve oblique triangles
- Compute the area of a triangle

Chapter 6.

- Find the period and amplitude of a transformation of a sine or cosine function
- Sketch the graphs of the sine and cosine functions
- Identify graphs of all six trigonometric functions
- Find domain and range of the inverse sine, cosine, and tangent functions
- Identify graphs of these inverse trig functions
- Simplify expressions involving compositions of trig functions and inverse trig functions

Chapter 7.

- Remember the Pythagorean trig identities and the reciprocal trig identities
- Verify other trig identities
- Solve basic trigonometric equations
- Use trig identities to simplify expressions, including complicated compositions of trig functions and inverse trig functions

Chapter 8.

- Plot points in polar coordinates on a polar grid
- Convert a point from polar coordinates to xy -coordinates
- Convert a point from xy -coordinates to polar coordinates
- Convert an equation from polar coordinates to xy -coordinates
- Given a complex number, write in polar form
- Using the polar form of complex numbers, compute products, quotients, and powers of complex numbers

Possible Word Problem Material.

- 1.4 and 1.6 (word problems with types of equations)
- 1.7 (word problems with inequalities)
- 3.1 (word problems with maximizing or minimizing a quadratic)
- 4.1, 4.2, and 4.5 (interest problems)
- 5.2 and 5.4 (using trig ratios and inverse trig functions to find lengths and angles of elevation)
- 5.5 and 5.6 (using the Law of Sines or Law of Cosines to find lengths and distances)