The final exam will consist of 25 questions drawn from the topics below in each objective. You will not be able to use notes, a calculator, or any other resource except those provided by your instructor. You will have access to scratch paper and a formula sheet. Each question will be worth 4 points. You need to score a 75 or higher to pass. You will be graded on the correctness of the answer and your work shown (notation, clarity, correct steps, etc.).

Objective 1

- All topics

Objective 2

- Quotient rule with negative exponents: Problem type 1
- Power rules with negative exponents
- Factoring a univariate polynomial by grouping: Problem type 1 or 2
- Factoring a multivariate polynomial by grouping: Problem type 1 or 2
- Factoring a quadratic with leading coefficient greater than 1: Problem type 1 or 2
- Factoring a sum or difference of two cubes
- Simplifying a ratio of polynomials
- Special products of radical expressions: Conjugates and squaring
- Complex fraction involving multivariate monomials
- Word problem involving the area between two rectangles

Objective 3

- Factoring out a monomial from a polynomial: Multivariate
- Power, product, and quotient rules with negative exponents
- Factoring a quadratic in two variables with leading coefficient greater than 1
- Dividing rational expressions involving quadratics with leading coefficients of 1
- Complex fraction made of sums involving rational expressions: Problem type 1, 2, 3
- Rational exponents: Negative exponents and fractional bases
- Simplifying a higher radical expression: Multivariate
- Solving a linear equation with several occurrences of the variable
- Solving equations with zero, one, or infinitely many solutions
- Solving a quadratic equation needing simplification

Objective 4

- Solving a word problem with two unknowns using a linear equation
- Solving a fraction word problem using a linear equation with the variable on both sides
- Solving an absolute value equation: Problem type 1 and 2
- Solving a distance, rate, time problem using a linear equation
- Solving an absolute value equation of the form $|ax + b| = |cx + d|$
- Union and intersection of finite sets
- Union and intersection of intervals
- Solving a compound linear inequality: Interval notation
- Solving an absolute value inequality: Problem type 3, 4, 5
- Solving a rational equation that simplifies to linear: Unlike binomial denominators
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a radical equation that simplifies to a linear equation: One radical, basic
- Solving a radical equation that simplifies to a quadratic equation: One radical, advanced
- Solving an equation with root index greater than 2: Problem type 1, 2
- Solving an equation with exponent $1/a$: Problem type 1
- Writing a multi-step inequality for a real-world situation

Objective 5

- Graphing a line given its equation in slope-intercept form: Integer slope
- Graphing a line given its equation in slope-intercept form: Fractional slope
- Graphing a line given its equation in standard form
- Finding $x-$ and $y-$intercepts of a line given the equation: Advanced
- Graphing a parabola of the form $y = ax^2$
- Finding slope given the graph of a line on a grid
- Finding slope given two points on the line
- Finding the slope and $y-$intercept of a line given its equation in the form $Ax+By = C$
- Writing the equation of the line through two given points
- Finding slopes of lines parallel and perpendicular to a line given in the form $Ax+By = C$

- Vertical line test
- Evaluating functions: Absolute value, rational, radical
- Domain and range from the graph of a continuous function
- Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
- Choosing a graph to fit a narrative: Advanced
- Graphing a parabola of the form $y = (x - h)^2 + k$
- Even and odd functions: Problem type 1
- Translating the graph of a function: Two steps
- Writing an equation for a function after a vertical and horizontal translation
- Interpreting the graphs of two functions

Objective 6

- Finding the perimeter or area of rectangle given one of these values
- Identifying solutions to a linear equation in two variables
- Identifying solutions to a system of linear equations
- Evaluating a piecewise-defined function
- Domain of a rational function: Excluded values
- Domain of a square root function: Advanced
- Finding the domain of fractional function involving radicals
- Finding the difference quotient for a linear or quadratic function
- Domain and range from the graph of a piecewise function
- Graphing an absolute value equation in the plane: Advanced
- Finding the average rate of change of a function
- Transforming the graph of a function by reflecting over an axis
- Transforming the graph of a function by shrinking or stretching
- Transforming the graph of a function using more than one transformation
- Sum, difference, and product of two functions
- Composition of two function: Basic
- Expressing a function as a composition of two functions
- Composition of two functions: Domain and range

- Determining whether two functions are inverses of each other
- Inverse functions: Linear, discrete
- Graphing a linear inequality in the plane: Slope-intercept form

Objective 7

- Multiplying complex numbers
- Dividing complex numbers
- Simplifying a power of i
- Solving a word problem using a quadratic equation with rational roots
- Solving a quadratic equation using the square root property: Exact answers, advanced
- Completing the square
- Solving a quadratic equation by completing the square: Exact answers
- Applying the quadratic formula
- Solving a rational equation that simplifies to quadratic: Binomial denominators, constant numerators
- Solving an equation that can be written in quadratic form: Problem type 1
- How the leading coefficient affects the shape of a parabola
- Finding the x-intercept(s) and the vertex of a parabola
- Finding the maximum or minimum of a quadratic function
- Writing the equation of a quadratic function given its graph
- Classifying the graph of a function

Objective 8

- Range of quadratic function
- Finding zeros of a polynomial function written in factored form
- Finding a polynomial of a given degree with given zeros: Real zeros
- Determining the end behavior of the graph of a polynomial function
- Polynomial long division: Problem type 1, 2, 3
- Finding the asymptotes of a rational function: Constant over linear
- Finding the asymptotes of a rational function: Linear over linear
- Solving a quadratic inequality written in factored form

Objective 9

- Translating the graph of an exponential function
- Converting between logarithmic and exponential equations
- Converting between natural logarithmic and exponential equations
- Evaluating logarithmic expressions
- Solving an equation of the form $\log_b(a) = c$
- Translating the graph of a logarithmic function
- Domain of a logarithmic function: Advanced
- Basic properties of logarithms
- Expanding a logarithmic expression: Problem type 2
- Writing an expression as a single logarithm
- Solving a multi-step equation involving a single logarithm: Problem type 1
- Solving an equation involving logarithms on both sides: Problem type 1 and 2
- Solving an exponential equation by finding common bases: Linear exponents

Objective 10

- Coterminal angles
- Finding coordinates on the unit circle for special angles
- Finding a point on the unit circle given one coordinate
- Trigonometric functions and special angles: Problem type 1,2,3
- Finding trigonometric ratios from a point on the unit circle
- Special right triangles: Exact answers
- Sine, cosine, and tangent ratios: Variables for side lengths
- Finding trigonometric ratios given a right triangle
- Reference angles: Problem type 1
- Determining the location of a terminal point given the signs of trigonometric values
- Finding values of trigonometric functions given information about an angle: Problem type 1, 2, 3
- Sketching the graph of $y = \sin(bx)$ or $y = \cos(bx)$
- Sketching the graph of $y = \sin(x + c)$ or $y = \cos(x + c)$
- Sketching the graph of $y = a\sin(bx + c)$ or $y = a\cos(bx + c)$

- Amplitude and period of sine and cosine functions
- Amplitude, period, and phase shift of sine and cosine functions
- Values of inverse trig functions
- Finding solutions in an interval for a basic equation involving sine or cosine
- Finding solutions in an interval for a basic tangent, cotangent, secant, or cosecant equation
- Solving a basic trigonometric equation involving sine or cosine

Objective 11

- Simplifying trigonometric expressions
- Sum and difference identities: Problem type 1
- Double-angle identities: Problem type 1
- Half-angle identities: Problem type 1

Objective 12

- Distance between two points in the plane: Exact answers
- Solving a system of linear equations using substitution
- Identifying the center and radius to graph a circle given its equation in standard form
- Finding the first terms of a sequence using an explicit rule with multiple occurrences of n
- Finding a specified term of an arithmetic sequence given two terms of the sequence
- Sum of the first n terms of an arithmetic sequence
- Estimating a limit numerically
- Finding limits from a graph
- Determining points of discontinuity from a graph