| Lecture: [garbled] | Hours Per Topic | Lecture: [garbled] |
|---|---|---|
| Polynomial and rational functions: Quadratic functions, polynomial functions, dividing polynomials, real zeros of polynomials, complex numbers, complex zeros, the fundamental theorem of algebra, and rational functions. | 15 | Graph quadratic functions using the standard form. Find the maximum and minimum values of a quadratic function and model with quadratic functions.<br><br>Graph basic polynomial functions. Determine the end behavior of a polynomial by considering the leading term. Use zeros to graph polynomials. Determine the shape of a graph near a zero. Find local maxima and minima of polynomials.<br><br>Perform long division of polynomials, use synthetic division to evaluate a polynomial. Apply the Remainder and the Factor Theorems to polynomials. Find the rational zeros of a polynomial. Apply Descartes' Rule of Signs and find the upper and lower bounds for zeros of polynomials.<br><br>Apply arithmetic operations on complex numbers. Find square roots of negative numbers. Determine all complex solutions of quadratic equations. Apply the Fundamental Theorem of Algebra to find the complete factorization of a polynomial.<br><br>Find zeros of polynomials and their multiplicities. Know that for real polynomials complex zeros come in conjugate pairs. Find all linear and quadratic factors of a polynomial.<br><br>Find all asymptotes of rational functions. Graph rational functions. |
| Exponential and logarithmic functions: Exponential functions, the natural exponential function, logarithmic functions, laws of logarithms, exponential and logarithmic equations, and modeling with exponential and logarithmic functions. | 15 | Draw graphs of exponential functions and logarithmic functions. Compute simple compound interest and continuously compounded interest. Apply the change of base formula. Solve exponential and logarithmic equations. Model with exponential growth and radioactive decay. Apply Newton's Law of Cooling and work with logarithmic scales. |

Systems of equations and inequalities: Systems of

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| | | sequence.  Define what is meant by an infinite series and find the sum of an infinite geometric series.<br><br>Calculate the amount of an annuity and give the present value of an annuity.  Find the monthly payment of an installment purchase.<br><br>Define the Principle of Mathematical Induction and prove a simple conjecture by mathematical induction.<br><br>Expand $(a+b)^n$ and give its binomial coefficients.  Prove the Binomial Theorem by using mathematical induction. |
| Limits: Finding limits numerically, finding limits graphically, tangent lines and derivatives, limits at infinity, limits of sequences, and areas. | 13 | Give the definition of a limit and estimate limits numerically and graphically.  Determine whether a limit fails to exist and  describe one-sided limits.  Apply the limit laws and algebra to find limits, including left- and right-hand limits.<br><br>Define tangent lines, derivatives, and instantaneous rates of change.  Use the concept of limit to find the slopes of tangents, instantaneous rates of change, and the derivative of a function.<br><br>Give limits at infinity of a function and give the definition of the limit of a sequence.<br><br>Describe the area problem and give the definition of area. |
| Final examination. | 2 | Final examination. |
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## Lab

| Lab: | Hours Per Topic | Lab: |
|------|-----------------|------|
| *cdca am c bc a gn gnl nmga am c cb gj a ',* | | *c a gnl c cc mm nl m dm a gnl c co gdj e anel gg c m am c ,'* |

Review of expressions.

Review of solving linear equations.

Adding, subtracting, and multiplying radical expressions.

Add or subtract like radicals.  Use the distributive property in expressions containing radicals.  Simplify radical expressions that contain mixed operations.

Rationalizing numerators and denominators of radical expressions.

Rationalize denominators.  Rationalize denominators that have a sum or difference with a square root term.  Rationalize numerators.

Radical equations and problem solving.

Complex numbers.

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| Exponential and logarithmic functions. Composite and inverse functions. | 2 | Find the composition of two functions.  Show that two functions are inverses.  Show that a function is one-to-one.  Find the inverse of a function.  Graph a given function's inverse function. |
| Exponential functions. | | Define and graph exponential functions.  Solve equations of the form $b^x = b^a$ for x.  Use exponential functions to solve application problems. |
| Logarithmic functions. | | Convert between exponential and logarithmic forms.   Solve logarithmic equations by changing to exponential form.  Graph logarithmic functions.  Solve applications involving logarithms. |
| Properties of logarithms. | | Apply the inverse property of logarithms.  Apply the product, quotient, and power properties of logarithms. |
| Common and natural logarithms. | | Define common logarithms and evaluate them using a calculator.  Solve applications using common logarithms.  Define natural logarithms and evaluate them using a calculator.  Solve applications using natural logarithms. |
| Exponential and logarithmic equations with applications. | | Solve equations that have variables as exponents.  Solve equations containing logarithms.  Solve applications involving exponential and logarithmic functions.  Use the change-of-base formula. |
| Conic sections: The parabola and the circle. | 2 | Graph parabolas of the form $x = a(y-k)^2 + h$.  Find the distance between two points.  Graph circles of the form $(x-h)^2 + (y-k)^2 = r^2$.  Find the equation of a circle with a given center and radius.  Graph circles of the form $x^2 + y^2 + dx + ey + f = 0$. |
| Ellipses and hyperbolas. | | Graph ellipses and hyperbolas. |
| Nonlinear systems of equations. | | Solve nonlinear systems of equations using substitution.  Solve nonlinear systems of equations using elimination. |
| | | Graph nonlinear inequalities.  Graph the solution set of a system of nonlinear inequalities. |