



East Side Union High School District Course of Study

Course Code: M4000XX

Transcript Title: P-MATH ANALYSIS

Description: Math Analysis is a ten unit, two semester course designed to prepare the student to enter college level Calculus. The topics parallel the Pre-Calculus and college Algebra and Trigonometry courses which are prerequisites for Calculus in the California State Universities and Community Colleges.

Length: Year

Credits: 10

Prerequisites: Students in this course should have successfully completed Algebra 2 with a grade C or better, and have a recommendation from the Algebra 2 instructor. **NOTE:** Instruction in and the use of the scientific calculator will be incorporated into the curriculum wherever practicable. Problems that depend on this instrument will be given. Calculators will be used in place of Log and Trig tables. This is in keeping with the State Guidelines. The Math Analysis contest will contain only material from the first semester outline, plus approximately 20 days material from the second semester. (Assuming the contest is in early March).

Sequence:

Pilot:

Magnet:

IPC Date: JANUARY 19, 1989

Grad

Requirement:

UC af: C

CSU:

Catalog Info: MATH ANALYSIS (year) Level: 11, 12 Prerequisites: C or better in Algebra 2 and/or teacher recommendation
Schools: AH IH JL MP OG WO PH ST SC YB Math Analysis is the fourth course in the traditional four year college preparatory mathematics sequence. The course is designed to prepare students for college level courses such as calculus and abstract algebra. The course will emphasize the analysis of the algebraic and trigonometric functions with attention given to their graphs. In addition vectors, operations with vectors, and applications of vectors to the solution of problems are covered. This course satisfies 1 year of the Mathematics requirement in the East Side Union High School District. This course satisfies 1 year of the "F" requirement at University of California and 1 year of the "G" requirement at California State University.

Goals.Objectives Resources	
Select the links below to be taken to available resources.	
	Resource
4.	GOALS The instructional program in Math Analysis should provide for the:
4.01	use of abstract thinking skills and a functional approach integrating as many concepts as possible.
4.02	development of the trigonometric functions and their graphical characteristics, inverse

	trigonometric functions, trigonometric identities, and trigonometric equations.
4.03	understanding of mathematical induction, conic sections, translations, rotations, vectors in the plane and space and the concept of a limit.
4.04	use of calculators and computers throughout the course to aid in the solution of problems and in making estimates and approximations to determine whether the solutions that are obtained are realistic.
5.	OBJECTIVES
5.01	Identify the six trigonometric functions and solve right triangles using trigonometric functions.
5.01.01	Identify the six trigonometric functions (sine, cosine, tangent, cotangent, secant, and cosecant) for a given angle in a right triangle.
5.01.02	Derive and state the sine and cosine of special acute angles (30, 45, and 60).
5.01.03	Solve right triangles using trigonometric functions. (5 days)
5.02	Demonstrate an understanding of the unit circle.
5.02.01	Use the wrapping function of the unit circle to find several values which map onto a given point. (2 days)
5.02.02	Find sine and cosine values of quadrantal angles. (1 day)
5.02.03	Define the other four trig functions and relate them to the unit circle. (2 days)
5.02.04	Find values of all six circular functions of special angles. (1 day)
5.02.05	Classify statements regarding functions of angles as true or false. (1 day)
5.02.06	Convert angle measure given in decimal form to degrees, minutes, and seconds, and conversely. (1 day)
5.02.07	Use a calculator to find all six trigonometric values for a given angle. (1 day)
5.02.08	Use trigonometric tables to find all six functions for a given angle. (1 day)
5.03	Perform conversions from radian measure to degree measure, and conversely.
5.03.01	Convert radian measure to degree measure, and conversely. (2 days)
5.03.02	Solve related word problems. (1 day)
5.04	Graph trigonometric functions.
5.04.01	Sketch the graph of all six trigonometric functions. (2 days)
5.04.02	For sine and cosine graphing, find the amplitude, period, phase shift, and vertical shift when given the equation of the graph. (5 days)
5.04.03	Determine asymptotes to assist in graphing tangent, cotangent, secant, and cosecant functions. (2 days)
5.05	Demonstrate an understanding of the basic trigonometric identities.
5.06	Demonstrate an understanding of the sum and difference identities.
5.07	Demonstrate an understanding of the double and half angle identities.
5.08	Demonstrate an understanding of the product/sum identities.
5.09	Define, graph and demonstrate an understanding of inverse trigonometric functions.
5.10	Solve trigonometric equations and inequalities.
5.10.01	Solve equations and inequalities that involve circular functions. (3 days)
5.11	Define and perform operations on vectors.
5.11.01	Define and perform arithmetic operations on vectors.
5.11.02	Find the norm (magnitude) of a given vector by using the distance formula.
5.11.03	Find the normal of a vector--a non-zero vector perpendicular to the given vector.
5.11.04	Find the parallel and perpendicular components of a given vector.
5.11.05	Use vectors to solve applied problems. (10 days)
5.12	Solve oblique triangles.
5.12.01	Write the law of cosines and use it to solve general triangles, given appropriate information. (1 day)
5.12.02	Write the law of sines and use it to solve general triangles, given appropriate information. (1 day)
5.12.03	Identify cases when information given is ambiguous and could lead to two different solution sets. (2 days)
5.12.04	Use various formulas to find the area of a general triangle when appropriate information is given. (i.e., use Heron's Formula when all three sides are known) (3 days)
5.13	Demonstrate an understanding of polar coordinates.

5.13.01	Convert rectangular coordinates to polar and conversely.
5.13.02	Graph polar equations. (3 days)
5.14	Find powers and roots of complex numbers using De Moivre's Theorem.
5.14.01	Use de Moivre's Theorem to find the powers and roots of complex numbers. (3 days)
5.15	Prove theorems using mathematical induction.
5.15.01	Prove given theorems about positive integers using the two step method of mathematical induction. (5 days)
5.16	Demonstrate an understanding of sequences and series.
5.16.01	Define sequence. (1 day)
5.16.02	Find missing terms of a given sequence. (1 day)
5.16.03	Identify whether a given sequence is arithmetic, geometric, or neither. (1 day)
5.16.04	Find difference, a specific term, and the sum of a specified number of terms of an arithmetic sequence. (2 days)
5.16.05	Find the ratio, a specific term, and the sum of a specified number of terms of a geometric sequence. (2 days)
5.16.06	Find the geometric-arithmetic mean(s) of given numbers. (1 day)
5.16.07	Generate a sequence from recursion and nth term formulas. (1 day)
5.16.08	Give recursion and/or indexing formula from a given sequence. (1 day)
5.16.09	Define series. (1 day)
5.16.10	Use summation notation to indicate a series. (1 day)
5.16.11	Tell whether a given series or sequence diverges or converges. (1 day)
5.16.12	Find the limit of a given converging series, intuitively, graphically, and mechanically. (3 days)
5.16.13	Express a repeating decimal as a common fraction as the limit of the infinite sequence of partial sums. (1 day)
5.17	Use the binomial theorem to expand binomials.
5.17.1	Define factorial (n!) (1 day)
5.17.2	Evaluate n things taken r at a time, using factorials. (1 day) n
5.17.3	Use the binomial theorem to expand binomials: $(ax + by)$ (1day)
5.17.4	Name a specified term of a binomial expansion. (3 days)
5.18	Demonstrate knowledge of functions and relations.
5.18.02	Identify given graphs as a relation or function graph (1 day)
5.18.03	Define domain and range; identify for a given function. (1 day)
5.18.04	Graph specified "step," "absolute value," and other "defined" functions. (3 days)
5.18.05	Perform arithmetic on functions. (1 day)
5.18.06	Find $f(g(x))$ and $g(f(x))$. (5 days)
5.18.07	Calculate limits of functions, not restricted to polynomials. (2 days)
5.18.08	Find, and test synthetically, the possible rational roots. (1 day)
5.18.09	Tell how many positive and/or negative real roots are possible. (1 day)
5.18.1	Define relation/function. (1 days)
5.18.10	Use synthetic substitution to find the value of a polynomial at a given value. (2 days)
5.18.11	Find the least intergral upper bound and the greatest integral lower bound. (2 days)
5.18.12	Find the vicinities of all real roots. (1 day)
5.18.13	Approximate irrational roots to a specified decimal place-by successive synthetic substitution. (1 day)
5.18.14	Perform arithmetic on complex numbers. (1 day)
5.18.15	Factor polynomials over the complex field.
5.18.16	Graph complex numbers as vectors on a cartesian system.
5.18.17	Find all roots of a polynomial: rational, irrational, (4 days for 15, 16, 17)
5.18.18	Find missing roots of a polynomial by using the relations between coefficients and roots, when given some of the roots. (1 day)
5.18.19	Write polynomials when given some roots and coefficients/ roots relations. (4 days)
5.18.20	Graph polynomial functions. (3 days)
5.18.21	Graph exponential and logarithmic functions. (2 days)
5.19	Perform arithmetic of matrices.

5.19.01	Perform arithmetic of matrices. (5 days)
5.5.1	Use trig definitions and basic identities to prove more complex identities. (5 days)
5.6.1	Use sum and difference identities to find exact values for special angles. (i.e., find the exact value of $\sin 75^\circ$). (2 days)
5.7.1	Use double and half angle identities to find exact values for special angles. (Find the exact value of $\cos 22 \frac{1}{2}^\circ$). (3 days)
5.8.1	Use the sum and product identities to write a given sum as a product, and conversely. (2 days)
5.8.2	Use results of 5.6, 5.7 and 5.8 to prove additional identities. (2 days)
5.9.1	Define and graph the inverse circular functions; Arcsin, Arccos, Arctan. (3 days)
5.9.2	Evaluate expressions involving Arc sin, Arccos, Arctan. (3 days)

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