CALCULUS FOR TEACHERS 2

MATH 615

Course Description

This course provides an intermediate level knowledge of mathematical concepts, techniques, and applications related to calculus and their application to the arts and sciences, professional studies and education.

Prerequisite: MATH 614 Calculus for Teachers I

Goals of the Course

1. To provide a suitable approach to calculus for teachers in both elementary and secondary schools.

2. To explore potential techniques for teaching selected concepts of calculus.

3. To investigate connections between calculus and other subjects, such as arts and sciences and allied branches of mathematics.

Evaluation Measures

1. Participation in classroom activities
2. Preparation of assignments
3. Written examinations

Course Contents

I Integration

1 Introduction
2 The indefinite integral
3 Applications of indefinite integration
4 Brief review of trigonometry
5 Differentiation and integration of sines and cosines
6 Area under a curve
7 Computation of areas as limits
8 Areas by calculation
9 The definite integral and the Fundamental Theorem of integral calculus
10 The trapezoidal rule for approximating an integral
11 Some comments on notation
12 Summary

Miscellaneous problems

II. Applications of the Definite Integral

1 Introduction
2 Area between two curves
3 Distance
4 Volumes
5 Approximations
6 Length of a plane curve
7 Area of a surface of revolution
8 Average value of a function
9 Moments and center of mass
10 Centroid and center of gravity
11 The Theorems of Pappus
12 Hydrostatic pressure
13 Work

Miscellaneous problems

III Transcendental Functions

1 The trigonometric functions
2 The inverse trigonometric functions
3 Derivatives of the inverse trigonometric functions
4 The natural logarithm
5 The derivative of ln *x*
6 Properties of natural logarithms
7 Graph of y = ln *x*
8 The exponential function
9 The function *a*^*u*
10 The function log *u*
11 Differential equations

Miscellaneous problems

Bibliography

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Addenda to Bibliography

Mathematical Association of America, *Resources for Calculus Collection*. Washington, DC, 1993.

Vol 1: Learning by Discovery: A Lab Manual for Calculus
Vol 2: Calculus Problems for a New Century
Vol 3: Applications of Calculus
Vol 4: Readings for Calculus

Periodicals

The Mathematics Teacher
The American Mathematics Monthly
School Science and Mathematics