

AP CALCULUS (BC)

GOALS: In addition to the goals outlined for AB Calculus, students will develop skills and understanding in:

1. Performing integration and differentiation on inverse trigonometric and hyperbolic functions
2. Performing advanced techniques of integration
3. Testing infinite sequences and series for convergence and divergence and finding sums and error approximations for infinite series
4. Performing integration and differentiation on parametric, polar, and vector functions

OBJECTIVES: Students will be able to:

(Parentheticals refer to sections of Thomas' Calculus, Weir et al., 11th ed.)

Goal 1. Performing integration and differentiation on inverse trigonometric and hyperbolic functions

- 1.1 Integrate and anti-differentiate inverse trigonometric functions (7.7)
- 1.2 Integrate and anti-differentiate hyperbolic functions (7.8)

Goal 2. Performing advanced techniques of integration

- 2.1 Integrate using partial fractions (8.3)
- 2.2 Determine convergence and divergence of improper integrals, including the use of L'Hopital's Rule (8.8, 4.6)
- 2.3 Use Euler's Method to approximate solutions to differential equations (9.3)
- 2.4 Interpret and solve logistic differential equations (supplementary handout)

Goal 3. Testing infinite sequences and series for convergence and divergence and finding sums and error approximations for infinite series

- 3.1 Determine convergence/divergence of infinite sequences (11.1)
- 3.2 Apply the Geometric Series Test and Telescoping Series Technique to determine convergence/divergence of infinite series (11.2)
- 3.3 Apply the Integral Test to determine convergence/divergence of infinite series (11.3)
- 3.4 Apply the Comparison and Limit Comparison Tests to determine convergence/divergence of infinite series (11.4)
- 3.5 Apply the Root and Ratio Tests to determine convergence/divergence of

- infinite series
- 3.6 Apply the Alternating Series Test to determine convergence/divergence of infinite series
- 3.7 Determine the radius and interval of convergence of power series (11.7)
- 3.8 Represent functions as Taylor and Maclaurin Series (11.8)
- 3.9 Manipulate Taylor series through substitution, differentiation, anti-differentiation, and arithmetic operations (11.8, 11.9)
- 3.10 Compute error estimates for power series, including LaGrange Error Bound (11.9, supplementary handout)

Goal 4. Performing integration and differentiation on parametric, polar, and vector functions

- 4.1 Perform integration and differentiation on parametric equations (3.5)
- 4.2 Compute lengths of plane curves (6.3)
- 4.3 Graph equations expressed in polar coordinates (10.5, 10.6)
- 4.4 Compute areas and lengths using polar coordinates (10.7)
- 4.5 Compute velocity and acceleration in polar form (supplementary handout)
- 4.6 Manipulate vector functions (12.1, 12.2, 13.1)
- 4.7 Model projectile motion using vectors (13.2)