

Sample Problems for Final Exam

Math 135 Sect 4 - Spring 2008 - Instructor: Radu C. Cascaval

Below is a list of review topics for the Final Exam. In preparation for the exam, you should review problems from the homework assignment, quizzes, the previous exams, the practice problems AND problems at the end of each chapter (1-5)

Topics to be reviewed for the final (each group will represented approx 1/4 of the final)

- Limits and Derivatives(1.3-1.6, 3.7, 2.1, 2.2)
 - Methods of Computing Limits
 - Limits at Infinity, l'Hopital's rule
 - Definition of Derivative
 - Derivative as a Function
- Rules of differentiation (2.3-2.6, 3.1-3.3, 3.5)
 - Power Rule
 - Product and Quotient Rule
 - Chain Rule
 - Derivative of exponential and logarithmic functions, inverse trig functions
- Application of Derivatives (2.7,2.8, 3.4, 4.1-4.5)
 - Rates of Change in Science
 - Related Rates
 - Curve Sketching (Max, Min, Critical points, Concavity, Inflection points, etc)
 - Optimization problems
- Antiderivatives and Integrals (4.7,5.1-5.5)
 - Antiderivatives and Indefinite Integrals
 - Areas and the Definite Integral
 - Fundamental Theorem of Calculus
 - Substitution Rule

Sample problems for antiderivatives and integrals

- (1) Check whether the following statements are TRUE or FALSE. Explain!
 - (a) $\int \frac{1}{(x+3)^2} dx = -\frac{1}{x+2} + C$
 - (b) $\int \tan^{-1} x dx = \frac{1}{1+x^2} + C$
 - (c) $\int \tan x dx = -\ln \cos x + C, \quad x \in [-\pi/2, \pi/2]$
- (2) Use the Fundamental Theorem of Calculus to find the derivative of the functions
 - (a) $\int_1^x \sqrt{1+3t} dt$
 - (b) $\int_0^{1/x} \tan^{-1} t dt$
 - (c) $\int_x^2 \cos(t^2) dt$
- (3) Evaluate the integrals
 - (a) $\int_{-1}^3 x^2 dx$
 - (b) $\int_1^2 \frac{2}{x^3} dx$
 - (c) $\int_0^1 (3 + x\sqrt{x}) dx$
 - (d) $\int_0^\pi \cos x dx$
 - (e) $\int_{-1}^1 \frac{1}{1+x^2} dx$
- (4) Find the indefinite integral
 - (a) $\int (1-t)(2+t^2) dt$
 - (b) $\int x^2 + 1 + \frac{1}{x^2+1} dx$
- (5) Evaluate the integrals using the appropriate substitution
 - (a) $\int \frac{\cos(\ln x)}{x^3} dx$
 - (b) $\int \frac{x^3}{1+x^4} dx$
 - (c) $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1+\cos^2 x} dx$