

MA216 (1/2020)

Final Exam 50% (Dec 8, 2020)

There will be 7-8 problems on the final exam.

Here is the list of topics for the final.

Chapter3: Applications of Differentiation (2 Problems)

- Related Rates
- Interval of Increase and Decrease; Concavity
- Relative Extreme; First and Second Derivative Tests
- Curve Sketching
- Optimization: Maximum and Minimum Values of a Function and applications

Chapter4:

Integration (1 Problems)

- Antiderivatives; The Indefinite Integral
- The Definite Integral
- The Fundamental Theorem of Calculus
- Evaluating Definite Integrals by Substitution

Techniques of Integration (2-3 Problems)

- Integration by Substitution
- Integration by Parts
- Improper Integrals

Applications of Definite Integral (1 Problem)

- Area Between Two Curves

Chapter5:

Functions of several Variables (1 Problem)

- Function of Two or More Variable
- Partial Derivatives
- Chain Rule
- Implicit Differentiation

Formula Sheet

Table of Integrals

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1)$$

$$\int e^x dx = e^x + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \sec^2 x dx = \tan x + C$$

$$\int \sec x \tan x dx = \sec x + C$$

$$\int \tan x dx = \ln |\sec x| + C$$

$$\int \sec x dx = \ln |\sec x + \tan x| + C$$

$$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C$$

$$\int \frac{1}{\sqrt{a^2-x^2}} dx = \sin^{-1} \left(\frac{x}{a} \right) + C$$

$$\int \frac{1}{x\sqrt{x^2-1}} dx = \sec^{-1} x + C$$

$$\int \frac{1}{x} dx = \ln |x| + C$$

$$\int a^x dx = \frac{a^x}{\ln a} + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \csc^2 x dx = -\cot x + C$$

$$\int \csc x \cot x dx = -\csc x + C$$

$$\int \cot x dx = \ln |\sin x| + C$$

$$\int \frac{1}{1+x^2} dx = \tan^{-1} x + C$$

$$\int \frac{1}{a^2+x^2} dx = \frac{1}{a} \tan^{-1} \left(\frac{x}{a} \right) + C$$