

What you should know before taking *Math 385 (Differential Equations)*

In order to take Math 385 you should first be familiar with the following concepts covered in the first three semesters of college calculus:

- * Differentiation and partial differentiation of functions (especially trigonometric and exponential functions), chain rule, product rule.
- * Partial derivatives

Examples:

Calculate the derivatives of the following functions

a) $f(x) = e^{-3x}$

b) $f(x) = e^{x^2}$

c) $f(x) = 2x e^{x^2}$

d) $f(x) = \sin(3x)$

e) $f(x) = \cos(5x^2)$

f) $f(x, y) = x^2 y \cos[3xy^2]$, find df/dx and df/dy

- * Integration of functions (especially trigonometric and exponential functions), substitution method.

Examples:

Calculate the following integrals

a) $\int_0^t \cos(3x) dx$

b) $\int_0^t e^{5x} dx$

c) $\int_0^t x e^{x^2} dx$

- * Solving basic systems of equations, quadratic formula.

Examples:

1) Solve the following system of linear equations:

$$2x + y + z = 5$$

$$x - y = 1$$

$$x + z = 2$$

2) Solve the following system of equations:

$$x^2 + y = 0,$$

$$y - 2x = 0.$$

3) Solve the equation $x^2 + 2x - 3 = 0$ by factoring the polynomial.

4) Solve the equation $2x^2 - 3x - 4 = 0$ by using the quadratic formula.