

# Calculus BC

## Section 6.4 - First - Order Differential Equations

Obj: - To solve a first order differential equation  
- To use linear differential equations in applications.

Definition:

A **first order linear differential equation** is of the form

$$\frac{dy}{dx} + P(x)y = Q(x)$$

where  $P$  and  $Q$  are continuous functions of  $x$   
(standard form)

**Theorem:**

The solution of a linear differential equation is

$$y = \frac{1}{u(x)} \int u(x)Q(x)dx$$

where  $u(x) = e^{\int P(x)dx}$  ← integrating factor

1. Solve the equation  
 $(y - 1) \sin x dx - dy = 0$

-write in standard form

$$\frac{dy}{dx} + P(x)y = Q(x)$$

$$P(x) =$$

$$Q(x) =$$

$$u(x) =$$

-find the integrating factor  $u(x)$

$$y =$$

- apply the general solution

$$y = \frac{1}{u(x)} \int u(x)Q(x)dx$$

2. Find the general solution of  $y' - y \tan x = 1$