

Example 1-2: Verify that the given function is a solution of the differential equation.

Example 1:  $y' + 8y = 0$ ,  $y = 4e^{-8x}$

Now you try: Example 2:  $y' + 4xy = 0$ ,  $y = 3e^{-2x^2}$

Steps to solving a differential equation:

1. Rewrite  $y'$  as  $\frac{dy}{dx}$ .
2. Move  $dy$  and all  $y$  terms to the left side of the equation.
3. Move  $dx$  and all  $x$  terms to the right side of the equation.
4. Integrate both sides.
5. Solve for  $y$ .
  - If general solution then you are done.
  - If particular solution then plug in the given information to solve for  $c$ . (Rewrite equation with the  $C$  value you found.)

Example 3: Find the general solution:  $y' = \frac{1}{2}xy$

Find the general solution:

Example 4:  $(1 + x^2)y' = x^3y$

Example 5:  $\frac{dx}{dt} = t \tan x$

Find the particular solution for the differential equation:

Example 6:

$$\frac{dy}{dt} = te^{-y}, \quad y(1) = 0$$

Example 7:

$$\sqrt{1-x^2} y' = y^2 + 1, \quad y(0) = 0$$

Example 8:

$$y' = \tan y, \quad y(\ln 2) = \frac{\pi}{2}$$