

## §9.1 Modeling with Differential Equations

## In-class Activity 9.1



Dr. Jorge Basilio

[gbasilio@pasadena.edu](mailto:gbasilio@pasadena.edu)

## Activity 1:

Verify that  $y(t) = \frac{2}{3}e^t + e^{-2t}$  is a solution to the DE  $y' + 2y = 2e^t$ .

## Activity 2:

Which of the following functions are solutions to  $y'' + y = \sin(x)$ ?

- (A)  $y(x) = \sin(x)$
- (B)  $y(x) = \cos(x)$
- (C)  $y(x) = \frac{1}{2}x \sin(x)$
- (D)  $y(x) = -\frac{1}{2}x \cos(x)$

### Activity 3:

Find the (i) general solutions and (ii) particular solutions to the following differential equations:

(a)  $\frac{dy}{dt} = t; y(0) = 1$

(b)  $\frac{dy}{dt} = \cos(t); y(0) = -2$

(c)  $\frac{dy}{dt} = \frac{1}{1+t^2}; y(1) = \frac{\pi}{4} + 1$

### Activity 4:

Match the differential equations with the solution graphs labeled I-IV. Give reasons for your choices.

(a)  $y' = 1 + x^2 + y^2$

(b)  $y' = xe^{-x^2-y^2}$

(c)  $y' = \frac{1}{1+e^{x^2+y^2}}$

(d)  $y' = \sin(xy) \cos(xy)$

