

Solve  $y'' + 9y = 10 \sin 2.9t$ ,  $y(0) = 1$ ,  $y'(0) = 1$

$$r^2 + 9 = 0$$

$$r = \pm 3i$$

$$y_h = C_1 \sin 3t + C_2 \cos 3t$$

$$y = A \sin 2.9t + B \cos 2.9t$$

$$y' = 2.9A \cos 2.9t - 2.9B \sin 2.9t$$

$$y'' = -2.9^2 A \sin 2.9t - 2.9^2 B \cos 2.9t$$

$$\text{LHS} = -2.9^2 A \sin 2.9t - 2.9^2 B \cos 2.9t + 9A \sin 2.9t + 9B \cos 2.9t$$

$$= (9 - 2.9^2) A \sin 2.9t + (9 - 2.9^2) B \cos 2.9t = 10 \sin 2.9t$$

$$9 - 2.9^2 A = 10$$

$$A = 16.95$$

$$B = 0$$

$$y = C_1 \sin 3t + C_2 \cos 3t + 16.95 \sin 2.9t$$

$$y' = 3C_1 \cos 3t - 3C_2 \sin 3t + (16.95)(2.9) \cos 2.9t$$

$$y(0) = 1: \quad 1 = C_2$$

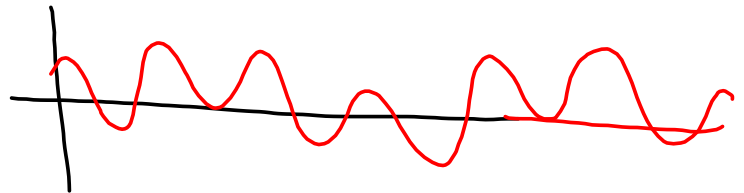
$$y'(0) = 1: \quad 1 = 3C_1 + 16.95(2.9)$$

$$C_1 = -16.05$$

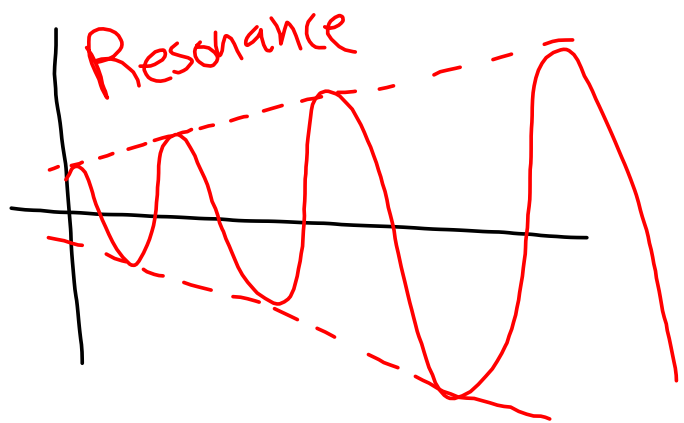
$$y = -16.05 \sin 3t + \cos 3t + 16.95 \sin 2.9t$$

Undamped systems,  $y(0)=1, y'(0)=1$

$$y'' + 9y = \sin t \Rightarrow y = \frac{7}{24} \sin 3t + \cos 3t + \frac{1}{8} \sin t$$



$$y'' + 9y = 2 \cos 3t \Rightarrow y = \frac{1}{3} \sin 3t + \cos 3t + \frac{1}{3} t \sin 3t$$



$$y = e^{-t} (\sin \cos)$$

