

## QUIZ

Solve the I.V.P

$$\ddot{x} + 11\dot{x} + 24x = 0, \quad x(0) = 0 \\ \dot{x}(0) = -7$$

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ANS.

Char. Eq.  $\lambda^2 + 11\lambda + 24 = 0$ ,  $a = 11$   
 $b = 24$

$$\lambda_{1,2} = \left( \frac{-11 \pm \sqrt{121 - 96}}{2} \right) \leftarrow \text{Eigen values}$$

$$= \frac{-11 \pm \sqrt{25}}{2} = \left\{ \frac{-11+5}{2}, \frac{-11-5}{2} \right\} \\ = \{-3, -8\} \leftarrow \text{Eigen values}$$

General sol'n:  $x(t) = C_1 e^{-3t} + C_2 e^{-8t}$

I.C  $x(0) = 0 \Rightarrow 0 = C_1 + C_2 \Rightarrow C_1 = -C_2$

$$\dot{x}(t) = -3C_1 e^{-3t} + (-8)C_2 e^{-8t}$$

$$\dot{x}(0) = -7 \Rightarrow 3C_1 + (-8)C_2$$

$$-7 = 3C_1 + 8C_1 \Rightarrow C_1 = \frac{-7}{5}$$

$$-7 = 5C_1 \quad C_2 = \frac{+7}{5}$$

Particular sol'n  $x(t) = \frac{-7}{5} e^{-3t} + \frac{7}{5} e^{-8t}$