

WRITE YOUR NAME:

MAP 2302 Quiz 9
Thursday October 3rd

Solve the initial value problem.

$$y'' + y = 0, \quad y(0) = 17, \quad y'(0) = 83$$

Auxiliary eqn $r^2 + 1 = 0$. (NOTE: NO y' term)

$$r^2 = -1$$

$$r = \pm i = 0 \pm i \quad \alpha = 0, \beta = 1$$

Two independent solutions: $\underbrace{e^{0t}}_1 \cos 1t, \underbrace{e^{0t}}_1 \sin 1t$

or more simply $\cos t, \sin t$. Makes sense because we know those satisfy $y'' + y = 0$.

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

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

$$17 = y(0) = \underbrace{A \cos 0}_1 + \underbrace{B \sin 0}_0 = A \quad \Rightarrow A = 17$$

$$83 = y'(0) = -\underbrace{A \sin 0}_0 + \underbrace{B \cos 0}_1 = B \quad \Rightarrow B = 83$$

$$\text{Answer: } y = 17 \cos t + 83 \sin t$$