

Quiz 8; Tuesday, November 1
MATH 54 with Ming Gu
GSI: Eric Hallman

Student name:

You have 15 minutes to complete the quiz. Calculators are not permitted.

1. (12 points) Find a solution of the form $y = A \cos 3t + B \sin 3t$ to the differential equation

$$y'' + 2y' + 4y = 5 \sin 3t.$$

ANSWER:

$$\begin{aligned}y &= A \cos 3t + B \sin 3t \\y' &= 3B \cos 3t - 3A \sin 3t \\y'' &= -9A \cos 3t - 9B \sin 3t \\y'' + 2y' + 4y &= (-5A + 6B) \cos 3t + (-6A - 5B) \sin 3t \\&= 5 \sin 3t\end{aligned}$$
$$\begin{bmatrix} -5 & 6 \\ -6 & -5 \end{bmatrix} \begin{bmatrix} A \\ B \end{bmatrix} = \begin{bmatrix} 0 \\ 5 \end{bmatrix}$$
$$\begin{bmatrix} A \\ B \end{bmatrix} = \frac{1}{61} \begin{bmatrix} -5 & -6 \\ 6 & -5 \end{bmatrix} \begin{bmatrix} 0 \\ 5 \end{bmatrix}$$
$$= \begin{bmatrix} -30/61 \\ -25/61 \end{bmatrix}$$
$$y = -\frac{30}{61} \cos 3t - \frac{25}{61} \sin 3t$$