

MTH 225  
Quiz #4

This is a group quiz. You can work with your classmates.

1. Let  $A \in M_{3 \times 3}(\mathbb{C})$  and suppose

$$\mathbf{v} = \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix}$$

is an eigenvector with corresponding eigenvalue  $\lambda = 3$ . Find an eigenvector and eigenvalue of the matrix  $A^2$ .

$$A \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix} = 3 \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix}$$

$$\Rightarrow A^2 \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix} = 3A \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix} = 9 \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix}$$

Therefore, 9 is an eigenvalue of  $A$  with corresponding eigenvector  $\vec{v} = \begin{bmatrix} \pi \\ e^\pi \\ \sqrt{e} \end{bmatrix}$ .