

Math 54 Discussion Section Problems

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You should work on the following problems in groups of 3 or 4. Try to get through as many as you can, but you aren't expected to finish everything. In fact, the answers are largely unimportant; making sure **everyone** in your group knows **how** to solve all the problems is what really matters.

1. Let $A = \begin{bmatrix} 2 & 0 & \pi \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$. Diagonalize A if possible, or explain why it cannot be done.
2. True/False. Justify your answers
 - (a) If A is a 2×2 matrix with eigenvalues π, π^2 , then A is diagonalizable.
 - (b) If A is $n \times n$ and is diagonalizable, then A must have n distinct eigenvalues.
 - (c) If A is diagonalizable, then there is only one way to choose P, D such that $A = PDP^{-1}$
3. (a) Show that if $A = PDP^{-1}$, then $A^n = PD^nP^{-1}$.
(b) Use part (a) to compute A^{314} where $A = \begin{bmatrix} 1 & -1 \\ 0 & -1 \end{bmatrix}$
4. The eigenvalues for $A = \begin{bmatrix} 2 & 2 & -1 \\ 1 & 3 & -1 \\ -1 & -2 & 2 \end{bmatrix}$ are $\lambda = 1, 5$. Without actually calculating any eigenvectors, determine if A is diagonalizable.
5. Show that if $b \neq 0$, then $\begin{bmatrix} \pi & b \\ 0 & \pi \end{bmatrix}$ is not diagonalizable.