

**Quiz 6;** Tuesday, October 11  
**MATH 54** with Ming Gu  
**GSI:** Eric Hallman

**Student name:**

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

1. (4 points) Find the eigenvalues and eigenvectors of the matrix  $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ . State which eigenvector is associated with which eigenvalue.

2. (2 points) If  $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ , find an invertible matrix  $P$  and a diagonal matrix  $D$  such that  $P^{-1}AP = D$ .

3. (6 points) Mark each statement as True or False. You do not have to explain your reasoning.
  - (a) If  $A$  is similar to  $B$  then  $A^2$  is similar to  $B^2$ .
  - (b) If  $A$  is similar to  $B$  then  $A$  and  $B$  have the same eigenvalues and eigenvectors.
  - (c) If  $AP = PD$  where  $D$  is a diagonal matrix then the nonzero columns of  $P$  are eigenvectors of  $A$ .
  - (d) Elementary row operations do not change the eigenvalues of a matrix.
  - (e) If a matrix is diagonalizable then its columns are linearly independent.
  - (f) Any eigenvector of  $A$  is also an eigenvector of  $A^2$ .