Name:_____
Quiz 5; Friday, March 3
MATH 54 with Prof. Sethian
GSI: Alex Carney

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

1. (2 points) Can a linear map $T : \mathbb{R}^4 \to \mathbb{R}^3$ have an eigenvector? Why or why not?

Let $A = \begin{pmatrix} 1 & c \\ 1 & 2 \end{pmatrix}$, where $c \in \mathbb{R}$. For what values of c does A have

(a) Exactly two real eigenvalues

(b) Exactly one real eigenvalue

(c) No real eigenvalues

2. (3 points) True or False:

   (a) A non-trivial rotation matrix $\mathbb{R}^2 \to \mathbb{R}^2$ has no real eigenvalues.

   (b) A matrix is invertible if and only if zero is not an eigenvalue.

   (c) $\begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$ is an eigenvector for $\begin{pmatrix} 5 & 8 & 16 \\ 4 & 1 & 8 \\ -4 & -4 & -11 \end{pmatrix}$.