

**MATH 2270: QUIZ 6**

1) a) (1 point) Let  $A$  be an  $n \times n$  matrix. Define what it means for  $v$  to be an eigenvector of  $A$ .

b) (1 point) Let  $\lambda$  be an eigenvalue of  $A$ . Define what the eigenspace corresponding to  $\lambda$  is.

2) a) (2 points) Find 3 eigenvectors for the matrix  $A = \begin{bmatrix} 10 & -9 \\ 4 & -2 \end{bmatrix}$  given that 4 is the only eigenvalue.

b) (2 points) Can you find a basis for  $\mathbb{R}^2$  consisting of eigenvectors of  $A$ ? Why or why not?

THERE ARE PROBLEMS ON THE BACK

3) (2 points) If  $\lambda$  is an eigenvalue of the matrix  $A$ , then explain why  $3\lambda$  is an eigenvalue of the matrix  $3A$ .

4) (2 point) If  $A^2 = \begin{bmatrix} 1 & 7 & 8 \\ 0 & 2 & 3 \\ 0 & 0 & 9 \end{bmatrix}$  then what are the possible eigenvalues for  $A$ ?

(Extra Credit - pretty hard, but see what you can do) (1 point) Suppose that  $A$  is a  $3 \times 3$  matrix with only one eigenvalue  $\lambda$ . When does  $\mathbb{R}^3$  have a basis consisting of eigenvectors of  $A$ ? I'm looking for a description of the entries of  $A$  and an explanation.