MATH 2270: QUIZ 7

1) a) (2 points) Suppose that A is a 3×3 matrix and v_1, v_2, v_3 satisfy

$$A\mathbf{v}_1 = 0, A\mathbf{v}_2 = 2\mathbf{v}_2, A\mathbf{v}_3 = -\mathbf{v}_3.$$

Explain why $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ is a basis for $\mathbb{R}^3$.

b) (2 points) Explain why A is diagonalizable and write down a diagonal matrix D to which A is similar.

c) (2 points) What is the matrix P so that $A = PDP^{-1}$?

THERE ARE PROBLEMS ON THE BACK

2) (2 point) Write down a 3×3 matrix that is **NOT** diagonalizable, and explain why.

3) (1 point) Suppose A is a 3 by 3 matrix with real entries and two eigenvalues, λ_1, λ_2. The eigenspaces for these eigenvalues are both 1-dimensional. Is A diagonalizable? Explain your answer.

4) (1 point) Show that if A is similar to B then A^2 is similar to B^2: