Math 1553 Worksheet: 6.2 and 6.4

1. Answer yes, no, or maybe. Justify your answers. In each case, A is a matrix whose entries are real numbers.

a) If A is a 3×3 matrix with characteristic polynomial $-\lambda(\lambda - 5)^2$, then the 5-eigenspace is 2-dimensional.

b) If A is an invertible 2×2 matrix, then A is diagonalizable.

c) Suppose A is a 7×7 matrix with four distinct eigenvalues. If one eigenspace has dimension 2, while another eigenspace has dimension 3, then A must be diagonalizable.

2. Consider the matrix

$$A = -\frac{1}{5}\begin{pmatrix} 8 & 3 \\ 2 & 7 \end{pmatrix}.$$

a) Find the eigenspaces of A. Draw and label them on the axes below.

b) Is A diagonalizable? If so, find an invertible 2×2 matrix P and a diagonal matrix D so that $A = PDP^{-1}$.