Group: _____ _____ _____ Name: _____

ma138 Worksheet NUMBER, DATE 2017

For each matrix below, find its eigenvalues and their corresponding eigenvectors.

1. a)

$$A = \begin{bmatrix} 2 & 0 \\ 4 & 4 \end{bmatrix}$$

b)

$$B = \begin{bmatrix} -1 & 5 \\ 5 & -1 \end{bmatrix}$$

c)

$$C = \begin{bmatrix} 25 & -3 \\ 3 & 15 \end{bmatrix}$$

2. What are the eigenvalues and corresponding eigenvectors of the matrix

a)

$$D = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$$

(This problem is an example of a matrix that has an *eigenvalue with multiplicity 2*. We will talk about this more in class)

b) Can you find a nonzero vector that is *not* an eigenvector of D? Why or why not?

3. Let $\vec{u}$, $\vec{v}$ and $\vec{w}$ be the column vectors below.

$$\vec{u} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}, \qquad \vec{v} = \begin{bmatrix} -3 \\ 8 \end{bmatrix}, \qquad \vec{w} = \begin{bmatrix} -5 \\ 16 \end{bmatrix}$$

Can you find numbers a and b so that the equation below is satisfied?

$$a\vec{u} + b\vec{v} = \vec{w}$$