3. (a) Suppose the transformation T of the plane is defined by its effect on a vector (x, y) by

$$T(x, y) = (x + y, -2x + 4y).$$

Write down the matrix representing this transformation with respect to the standard basis. [2]

(b) Find the eigenvalues and the corresponding unit eigenvectors for the matrix you wrote down in the previous part. [6]

(c) Explain the geometric significance of the eigenvectors and the eigenvalues of a matrix. [2]