

1. Suppose the eigenvalues of a matrix  $A$  are 1 and 5, and the corresponding eigenvectors are  $(2, -1)$  and  $(2, 1)$ .
  - a) Use the Eigenvalue Decomposition to find matrix  $A$ .
  - b) Use the Eigenvalue Decomposition to calculate  $A^5$ .
  
2. Find a linear transformation matrix  $A$  that keeps the direction of vector  $(2, 1)$  while stretching it 4 times and keeps the direction of vector  $(0, -1)$  while stretching it twice.