# Question 1

Characteristic polynomial of =

The roots of the characteristic polynomial are (clearly)

The eigenvalues of are the roots of its characteristic polynomial and hence

We solve for eigenvectors as .

For :

For

Power iteration is straightforward. . After normalization,

Power iteration will eventually converge to the eigenvector with largest absolute value. In this case, eigenvalue=3. Hence **power iteration will converge to**

Rayleigh quotient is . For , we have and . Hence the Rayleigh quotient is **3.5**

Inverse iteration would converge to the eigenvector with smallest absolute value of eigenvalue. In this case, eigenvalue=-1, and eigenvector is

Upon using inverse iteration with shift=2, the algorithm would converge to the eigenvector whose eigenvalue is closest to 2. In this case, eigenvalue=3, hence the eigenvector is

Since is not symmetric, QR iteration would converge to a triangular/block triangular matrix.