

Write a program that implements the power method for finding the largest eigenvalue and a corresponding eigenvector. At each iteration print the number of iterations, the approximate value of the eigenvalue and the corresponding eigenvector. Run your code with the given input files. Use the provided gnuplot file to create pictures showing the convergence of eigenvalues and eigenvectors.

**Turn in:**

- This problem sheet with your name.
- A summary sheet explaining what you did, how you approached the problem, what was accomplished, what was not accomplished, etc.
- The eigenvalue-eigenvector pairs for each input file. If a matrix is too large then include only the first 5 coordinates of the eigenvector.
- The characteristic polynomial and all the eigenvalues of matrix 2.

**Website:**

- Create a directory called `10eigen` on your web site and make all your input, output and source files available in this directory. Write the url for the website on this problem sheet.

**Input:**

A square matrix.

**Output:**

The number of iterations, the approximate eigenvalue and the corresponding eigenvector.

**Sample input:**

```
-1 0
0 0
```

**Sample output:**

```
0 5 2 5
1 -0.4 -0.4 0
2 -1 -1 0
```

**Hints:**

- Stop the iterations if the norm of the change in the eigenvector is less than a tolerance of  $10^{-6}$ .
- Try to use the makefile I created for this project. It creates the required files automatically.
- Use an initial guess of  $x = (x_1, \dots, x_n)$  where  $x_i = i^2 + 1$ . Don't forget that in the program the index starts at 0. A random number would work best here but this makes it easier to verify your output against my output.