

Project 9 - Find Eigenvalues

1. Write a program that computes the eigenvalues of a 2x2 matrix. Your program should allow the user to enter the four values for the matrix. Your program should print the eigenvalues. If there are more than one eigenvalue, your program must find and print both. For this part, it's OK if it only works for 2x2 matrices. Try it out for the following cases. For each case check your work by hand.

$$\begin{pmatrix} 1 & 3 \\ 0 & 2 \end{pmatrix} \quad (0.1)$$

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad (0.2)$$

2. What will your program do if the eigenvalues are complex? Use your program to try to determine the eigenvalues of the following matrix. Explore a range of 100 to -100 for the following matrix.

$$\begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix} \quad (0.3)$$

3. Try this matrix. It represents a second derivative of a function (more on Wednesday).

$$\begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} \quad (0.4)$$

4. Finally, alter your program to be able to find the eigenvalues of a 3x3 version of this:

$$\begin{pmatrix} -2 & 1 & 0 \\ 1 & -2 & 1 \\ 0 & 1 & -2 \end{pmatrix} \quad (0.5)$$

Due Wednesday, April 17th.