Relationship between Graph and E−vectors and L−values

Largest L−value, E−vector/sqrt(L−value)

Smallest L−value, E−vector/sqrt(L−value)

FIGURE 1. $2x^2 + 2xy + 3y^2 = 1$ and E-vectors/L-values of A = [2 1; 1 3]

1. INTRODUCTION

This lab explores the connections between equations of the form

$$ax^2 + 2bxy + cy^2 = 1$$

and properties of the matrix

$$A = \begin{bmatrix} a & b \\ b & c \end{bmatrix}$$

discovered by iteration. You will be given a collection of symmetric matrices and for each 2×2 matrix (like A above) in your list you will have to use Scilab to plot both the conic section (This is described in qform.pdf) and the arrows like in lambda.pdf on the same plot. Explicitly your code should find the L-values and E-vectors, and check if the 2 E-vectors are perpendicular.

For each 3×3 matrix on your list, you need to find all 3 L-values and E-vectors via the iteration method and check if the 3 E-vectors are perpendicular.

2. EXAMPLE

If $A = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ then Figure 1 shows the sample plot.

3. DELIVERABLES

Your lab 1 assignment must be a hardcopy document, no electronic files will be accepted. The commented code/diary file and plots in one stapled document. Note that the assignment is due at 3pm Friday.