EE 271 - Exam 1

Feb. 14, 2020

1. Consider the following arrays

$$\mathbf{A} = \begin{bmatrix} 1 & 4 & 2 \\ 2 & 4 & 100 \\ 7 & 9 & 7 \end{bmatrix}$$

$$\mathbf{B} = ln(A)$$

Evualuate the maximum value in the vector resulting from element-by-element multiplication of the second column of **B** with the first column of **A**

2. Planets and planetary satellites move in elliptical orbits. The general equation for an ellipse centered at the origin, whose major and minor axes lie along the x and y axes, is

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

This can be solved for y as follows:

$$y = \pm b\sqrt{(1 - \frac{x^2}{a^2})}$$

Create a function that will plot the entire ellipse, given the inputs a and b. Obtain the plot for the case $a = 1$, $b = 2$.

3. Consider the array **A**

$$\mathbf{A} = \begin{bmatrix} 3 & 5 & -4 \\ -8 & -1 & 33 \\ -17 & 6 & -9 \end{bmatrix}$$

Write a program that computes the array **B** by computing the natural logarithm of all the elements of **A** whose value is no less than 1, and adding 20 to each element that is equal to or greater than 1. Do this in two ways:

(a) By using a **for loop** with conditional statements

(b) By using a **logical array** as a mask