LAB 1 MA 226

DUE In Class FRIDAY MARCH 28

In this assignment you will study the two parameter family of linear differential equations given by

$$\frac{dY}{dt} = \begin{bmatrix} A & B \\ \alpha & \beta \end{bmatrix} Y$$

where A and B are the parameters and α and β are the right most non-zero digits of your BU Id number. So, for example, if your BU Id number is $U02174600$ then you will be studying the 2 parameter family

$$\frac{dY}{dt} = \begin{bmatrix} A & B \\ 4 & 6 \end{bmatrix} Y.$$

(If your BU Id number does not have two non-zero digits, please see me.)

You will hand in two (2) 8.5×11 pieces of paper (absolutely no more than 2 pieces of paper), stapled in the upper left hand corner.

On the first piece of paper you will summarize the method and calculations on the front side. Also, your name and BU Id number will be in the upper left hand corner. The back of this piece of paper will contain no writing–it may be blank or you may use recycled paper with printing, but nothing on the back will be graded.

On the second piece of paper, you will carefully draw a picture of the A, B plane indicating which values of A and B correspond to which types of linear systems (i.e., sink, spiral sink, saddle, etc.). You should annotate and decorate this picture using all of your artistic skills so that it is clear. This is really a type of bifurcation diagram for this two parameter family of linear systems so communicate as much information as you can. NO WORDS may be written on this piece of paper (the only letters should be A and B on the axes), but you should use colors, etc. (Please avoid glitter because it gets all over everything...)

I will grade this assignment by first looking at the picture and determining if you have the correct diagram for your system. If so, you will receive 80% of the credit. The other 20% will be determined by the quality of your picture, how much information you communicate and how effectively you communicate that information. If your picture is incorrect, then I will look at your first page to see if I can determine where you went wrong in your calculations and give some partial credit.

Hint: You might want to read section 3.7. Figure 3.48 is a very simple version of what your picture might look like (certainly when you finish, you should be able to see how your picture of the A, B plane relates to FIgure 3.48).