

Math 2270-1
Maple Project I
Monday September 12

This is a group project, if you wish it to be so! (That way you can work together and ask each other to explain stuff!) Your group can consist of up to three classmates working together. Each group should hand in one stapled project, with the individuals clearly indentified. You may create your own group, or ask me to help organize one for you in class. You also have the option of working individually. All group members will receive the same group grade. This project is due next Friday - September 23. You probably want to finish it earlier, since our first exam is Tuesday September 27.

Part A: some matrix algebra questions

(These questions are modified from problems on page 27 of the text *Multivariable Mathematics with Maple*, by J.A. Carlson and J.M Johnson.) You are to create a document in which you answer the following questions, via a mixture of Maple computations and textual insertions. You are to print out a copy of this document to hand in, as part A of your first Maple project. Don't forget to put your name and section number on it!

Define, using Maple's "old" linear algebra package "linalg",

$$A := \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$B := \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

- 1a) Compute AB and BA . Are they the same?
- 1b) Compute $A+B$ and $B+A$. Are they the same?
- 1c) Define C to be $A+B$. Compute C^2 and compare it to $A^2 + 2AB + B^2$. Are they the same? Can you think of a small change you could make in the expression " $A^2 + 2AB + B^2$ " in order to make it equal to C^2 ? Justify your answers!
- 1d) Define $v=(1,2,3)$ to be a vector. Compute Av . What does Maple give you when you try vA ? Explain.
- 1e) Solve $Bx=v$ for x , where v is the vector in (1d). Get your solution in each of the following three ways: use the `rref` command on the augmented matrix; use the command "`linsolve`"; use the inverse matrix to B .
- 2a) Solve $Ax=v$ for x , where A and v are as indicated above. Verify, with Maple, that your solution x actually solves the equation $Ax=v$.
- 2b) Repeat your work above in order to solve $Ax=w$, where $w=(-1,4,1)$. Explain your answer.

Part B: make two fractals

1) Recreate one of the fractals from the September 9 class handout, or from the fractals directory on Professor Korevaar's home page. The class notes are the file

<http://www.math.utah.edu/~korevaar/2270fall05/fractals.pdf>

The fractal directory is

<http://www.math.utah.edu/~korevaar/fractals>

The fractal directory also contains the Maple procedures you'll be using to create your fractals.

Add text to your re-creation which explains how you found the six parameters for just a single one of your affine maps.

2) Make a document in which you create an original fractal. Use the procedures in the fractal directory but come up with your own contraction affine transformations.