**CSCI 2150L**

**Session 7 Topics:**

**9/17/2014**

**Fall 2014**

1. We started with a review on matrix multiplication and to serve the purpose created the following row and column matrices.

4

6

A = [1 -2 0 5 6 -8] and B = -7

3

1

20

[Questions: Try to create B in two different ways. If B is a transpose of another matrix then what would the matrix be?]

1. We tried matrix multiplication with A and B above and computed  and . An interesting observation about below is that each column of the resulting matrix is the original B matrix

4 -8 0 20 24 -32

6 -12 0 30 36 -48

-7 14 0 -35 -42 56

3 -6 0 15 18 -24

1 -2 0 5 6 -8

20 -40 0 100 120 -160

multiplied by individual element of A. [Question: Think about why dimension of the resulting matrix is ]

1. Similar to above we operated one of the following matrices by the other one. The matrices were

A = [11, 12, 13; 14, 15, 16] with dimension ; and

B = [1, 2; 3, 4; 5, 6] with dimension .

The operation we performed was raising each element of A’ to corresponding element of B.

[Question: Why we used A’ instead of A?]

Here we’re dealing with random integers that seemingly don’t have any relation between them. But if we generated A and B using a mathematical function then the elements of an array would have relation between them. Subsequently the operations performed in 2 or 3 would give us interesting patterns.

1. We selected two set of functions given in two columns as followed. We tried raising elements of one function from one group to the elements of other.

|  |  |  |
| --- | --- | --- |
| A | B | B |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

To evaluate the functions above we generated a row matrix . Then we calculated each set of functions in each for of the above table. [Notice that the functions in column C is the negative of the function in column B].

For each row we calculated A.^B and A.^C. Subsequently these two results were plotted in the same figure to find if A, B and C are generated using functions as above the what kind of patterns we may get. We actually got quite a few nice looking patterns for these plots.

If these pattern were plotted on 3-D we may construct a surface governed by the surface.

1. At the end we find the parametric representation of an ellipse. The equation for an ellipse whose major and minor axis coincides with Cartesian axes is given as follows:

which is similar to the equation of a circle (see previous handout). By comparing the above equation with that of a circle we formed the following parametric representation of an ellipse as follows:

which satisfies the equation (1) above.

Antipodal Points

a

b

X

Y

Following is an ellipse with its different parameters. In an ellipse

the biggest distance between antipodal points (shown in figure)

is referred to as major axis. The other is called a minor axis.

Here in the figure beside we have assumed.

Thus a is major axis and b is the minor axis for this

Ellipse.