EEE F311 Communication Systems Lab

Experiment 2:

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Q1: Here we are considering two matrices a = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and b = $\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$

We can see the output of my function kronecker(a,b) and in-built function kron(a,b) comes out to be the same.

```
a =

     1     2
     3     4

>> b = [2,2;2,2]

b =

     2     2
     2     2

>> kronecker(a,b)

ans =

     2     2     4     4
     2     2     4     4
     6     6     8     8
     6     6     8     8

>> kron(a,b)

ans =

     2     2     4     4
     2     2     4     4
     6     6     8     8
     6     6     8     8
```

Q2: Here we are using an identity matrix so that we can confirm by manual calculation also since A^i for all "i" belongs to [1,10] is A itself. so the coefficient comes out to be $\left(\sum_{i=1}^{i=10}\frac{1}{i!}\right) \times A$ which can be approximated for exponential matrix ("matrixExponential.m" function)

The value of this $\left(\sum_{i=1}^{i=10}\frac{1}{i!}\right)$ Comes out to be 1.7183. We also use a "matmul.m" function for multiplying two matrices,

```
>> A = [1,0;0,1]

A =

     1     0
     0     1

>> matrixExponential(A)

ans =

    1.7183         0
         0    1.7183
```

Q3: $(0.01)^n < 0.00001$ and for this the n value comes out to be 3 by manual verification and it is the same from the function.

```
>> threshold(0.01,0.00001)

ans =

     3
```

Q4: The random vector whose mean is 0 and variance is 1 and size n can be constructed from the function randn(n). From the constructed vector or matrix, we can easily calculate the average of the values of matrix.

```
>> GaussianRandomVector(5)

randomVector =

    0.5377    1.8339   -2.2588    0.8622    0.3188


ans =

    0.2587
```