Data Science using Python (CSE 3054)

MINOR ASSIGNMENT-2: VECTORS, STATISTICS AND PROBABILITY

1. Write a menu-driven program to perform Addition, Subtraction, Scalar Multiplication, Dot Product and Length of vectors.
2. Write a program that takes the order of the matrix and creates a matrix in the following manner: The (ij)th entry of the matrix should be the sum of i and j. Eg: The 0^{th} row and 0^{th} column should have the value (0+0) i.e. 0 and the 0^{th} row and first column should have value (0+1) i.e. 1 and so on.
3. Write two functions that extract the rows and columns of a matrix A.
4. Write a function to compute the component-wise mean of a list of vectors. Assert the condition that the vectors must be of same length.
5. Generate a list of 100 random integers between 1 and 100 and plot a histogram of the same.
6. Write a program to find median of a given list of integers. Combine both odd and even number of terms.
7. We have defined the function normal_cdf. Write a program to invert normal_cdf to find the value corresponding to a specified probability.
8. Plot the Normal PDFs using various value of μ and σ as mentioned below:

μ	σ
0	1
0	2
0	0.5
-1	1

   Use different line styles for each plot and compare the graphs thus obtained. You can use any range for x-axis.
9. Do the same as above question for Normal CDFs using the same values of μ and σ.
10. What are random variables? Give two examples.
11. What are independent events? Give two examples of the same.
12. Using the Binomial(n, p) distribution plot a histogram to show the actual binomial samples. Use a line chart to show the normal approximation. Plot both in the same graph. Take n=100, p=0.75 and number of points should be 100.