-:Part 2:-

PDF:- Probability density function

CDF:- Cumulative density function

PPF:- Percent point functions

**Question 1:**

For a given Mean 494 and standard deviation = 100

1. What is the probability that a randomly selected score is between 600 and its mean.

2. What is the probability of obtaining a score more than 700.

3. Score that is less than 550.

4. Score between 300 and 600.

**Solution**:

We have a normally distributed data N, with mean = 494 and deviation = 100.

So we can represent it as N(494,100).

**Answer for 1**:

To Find the range for probability here,

The desired result will be the area between x = 494 to x=600.

We substract the CDF494 from CDF600

*import scipy.stats as st*

*prob1= st.norm.cdf(x=600,loc=494,scale=100)*

*prob2= st.norm.cdf(x=494,loc=494,scale=100)*

*prob = prob1-prob2*

*print('Probablity = ', prob)*

O/P = 0.3554277003360904

**Answer for 2**:

To find the probability of obtaining a score more than 700, we need to find the area under the curve from 700 till end of X-axis.

We use scipy library and stats package in it, and to calculate the area under the curve we use CDF function.

*import scipy.stats as st*

*prob = st.norm.cdf(x=700,loc=494,scale=100)*

*print (prob)*

O/P = 0.9803007295906231

Here, prob is the area from starting till X=700.

But we need the area from 700 till end.

Also, we know the total area under curve = 1, so desired area = 1-prob.

1-prob = 0.019699270409376912

**Answer for 3**:

*import scipy.stats as st*

*prob= st.norm.cdf(x=550,loc=494,scale=100)*

*print (prob)*

O/P = 0.712260281150973

**Answer for 4**:

*import scipy.stats as st*

*prob1= st.norm.cdf(x=600,loc=494,scale=100)*

*prob2= st.norm.cdf(x=300,loc=494,scale=100)*

*prob = prob1-prob2*

*print('Probablity = ', prob)*

O/P = 0.8292378553956377

**Question 2:**

Suppose during any hour in large departmental store, the average number of shoppers is 448, with the standard deviation of 21 shoppers. What is the probability that a random sample of 49 different shopping hours will yield a sample mean between 441 and 446 shoppers.

**Answer:**

Here, we have the population mean = 448 and SD = 21.

Now, we need to find the probability for the sample out of the given population with sample size of 49.

As, sample size>30, so in theoretical problems we can assume that the sample size is adequate and we can apply Central limit theorem.

So for the sample,

Mean of the distribution will be = population mean = 448

And SD = SD for population/ sqrt(sample size).

*import scipy.stats as st*

*import math as m*

*prob1 = st.norm.cdf(x=446,loc=448,scale=21/m.sqrt(49))*

*prob2 = st.norm.cdf(x=441,loc=448,scale=21/m.sqrt(49))*

*prob = prob1-prob2*

*print (‘prob’)*

O/P = 0.24267720891827757