**Experiment-IV**

**Central limit theorem**

**Sampling Theory:**

Sampling – Central limit theorem (without proof) – Sampling distribution of means – pointestimation – interval estimation

**Central limit theorem:**

**Problem 1:** A random sample of size 64 is taken from a normal population with µ = 51.4 and σ = 6.8. What is the probability that the mean of the sample will (i) exceed 52.9 (ii) fall between 50.5 and 52.3 (iii) be less than 50.6.

**Aim:-** To find the probabilities that the mean of the sample will (i) exceed 52.9 (ii) fall between 50.5 and 52.3 (iii) be less than 50.6.

**Formula:-**

If be the mean of a sample size n drawn from a population with mean µ and SD σ then the standardized sample mean is is a random variable whose distribution approached that of the standard normal distribution N(0,1) as n→∞

**R – commands:-**

mu<-51.4

mu

51.4

sigma<-6.8

sigma

6.8

n<-64

n

64

S.E<-sigma/(sqrt(n))

S.E

0.85

problem(i)

x<-52.9

x

52.9

pnorm(x, mu, S.E ,lower.tail = F)

0.388066

Problem(ii)

x2<-52.3

x2

52.3

x1<-50.5

x1

50.5

pnorm(x2,mu,S.E ,lower.tail = T) - pnorm(x1,mu,S.E ,lower.tail = T)

or

pnorm(52.3,51.4,0.85)-pnorm(50.5,51.4,0.85)

0.7103198

Problem(iii)

x<-50.6

x

50.6

pnorm(,mu,S.E ,lower.tail = T)

or

pnorm(50.6,51.4,0.85)

**0.1733072**

**Output:-**

1. the probability that the mean of the sample will exceed 52.9 is

P(0.0388066

1. the probability that the mean of the sample will fall between 50.5 and 52.3 is P( = 0.7103198
2. the probability that the mean of the sample will be less than 50.6 is

P ( = 0.1733072

Problem 02 : A random sample of size 16 is taken from a normal population with What is the probability that the mean of sample will be less than 775.

**Aim:-** To find the probabilities that the mean of the sample will be less than 775

**Formula:-**

If be the mean of a sample size n drawn from a population with mean µ and SD σ then the standardized sample mean is is a random variable whose distribution approached that of the standard normal distribution N(0,1) as n→∞

**R – commands:-**

mu<-800

mu

800

sigma<-40

sigma

40

n<-16

n

16

S.E<-sigma/(sqrt(n))

S.E

10

x<-775

x

775

pnorm(x, mu, S.E ,lower.tail = F)

or

pnorm(775, 800, 10 ,lower.tail = F)

0.006209665

**Output:-**

the probability that the mean of the sample will be less than 775 is P( 0.006209665