**Normal Distribution, Functions & Random Variables: set-2**

1) The work begins after 10 min, so the average time increase from 45min to 55min.

For normal distribution: -

X = 50

= 45

= 8

Z = (X-)/ = (X-45)/8

Z = (50-45)/8

P(X<=50)=P(Z<=(50-45)/8)

Z = 0.625 =73.4%

Probability that the service manager will not meet his demand will be = 100 – 73.4

= 26.6% or 0.2676

2) Mean = 38

SD = 6

Z score = (value – mean)/SD

a) Z score for 44 = (44 -38)/6 =1 =>84.13%

People above 44 ages = 100 – 84.13 = 15.87% = 63 out of 400

Z score for 38 = (38 – 38)/6 = 0 => 50%

Hence people between 38 & 44 age = 84.13 – 50 = 34.13% ~ 137 out of 4000

Hence more employees at the processing center are older than 44 than between 38 and 44.is

“FALSE”

b) Z scores for 30 =(30 – 38)/6 = -1.33 = 9.15% = 36 out of 400

Hence a training program for employees under the age at the center would be expected to

Attract about 36 employees - TRUE

3) The difference between 2X1 and X1 + X2 is N(0,62).

According to Central Limit Theorem, the properties of normal random variables,

*X1* ~ *N*(μ, σ2) and *X*2 ~ *N*(μ, σ2) are two independent distributed random variables.

Given to find, 2X1: 2X1 ~ N(2,222) => 2X1 ~ N(2,22)

X1 + X2 ~ N(,2 + 2) ~ N(2,22)

And the difference between two is given by: 2*X1* – *(*X1 + X2) ~ *N*(2μ –2, 212 + 412) ~ N(0,62)

The mean of 2X1 is 2 times more than the variance of X1 + X2 .

4) The probability of getting value between a & b is 0.99

So, the probability of value getting outside a & b is 1-0.99 = 0.01

The probability towards left of a = -0.01/2 = -0.05

The probability towards right of b = 0.01/2 = 0.05

Since we have probabilities of a & b, we need to calculate the probability of X,

By finding Standard Normal Variable (z), need to calculate X:

Z=(X-Meu)/sigma

For a probability of 0.005, z values is -2.57

Z\*+ = X

a – (-2.57) \*20+100=151.4

b – (-2.57) \*20+100=48.6

Two values symmetric about mean for the given standard normal distribution are [48.5,151.5].

5) Division1 = Profit1 ~ N(5, 32) = N(X1=5, S11=32)

Division2 = Profit2 ~ N(7, 42) = N(X2=7, S22=42)

= Company = (Profit1 + Profit2) = Mean Profit of Division1 + Division2

= 5 + 7 = 12

Mean profit of company in rupees = 12\*45 = 540

i) Variance of the company distribution = ^2 = 32=42 = 9+16 = 25 = 52

Standard Deviation of the company distribution = = 2) = 5

Confidence Level = 0.95

Therefore, Confidence Interval = + za/2= 0.025()

= 540 + 1.96(225) = (99,981)

ii) 5th percentile from z table= Za/2= 0.05 = -1.645

5th percentile = – Za/2= 0.05()

= 540 – 1.645(225)

= 169.87

iii) The division 2(Profit2 ~ N(7, 42)) has a larger probability of making a loss in a given year.