1. Normal or Gaussian distribution is a continuous probability distribution that has a bell-shaped probability density function (Gaussian function), or informally a bell curve. In a normal distribution the mean is 0 and variance is 1.

f(x) = [1/σ (√2π)] exp[-(x-u) ^2 / 2.σ ^2]

Mean: u , Variance: s^2

2.Find the area under the standard normal curve between z = 0 and z = 1.53?

Using a standard normal distribution table, we can find the area under the curve between z = 0 and z = 1.53 by looking up the values for z = 0 and z = 1.53 in the table and subtracting the value for z = 0 from the value for z = 1.53. The table gives us the area to the left of the z-score, so we need to subtract the area to the left of z = 0 from the area to the left of z = 1.53.

Looking up z = 0 in the table gives us an area of 0.5000, since the standard normal distribution is symmetric around the mean of 0. Looking up z = 1.53 in the table gives us an area of 0.9382. Subtracting the area to the left of z = 0 from the area to the left of z = 1.53 4
gives us:
0.9382 0.5000 = 0.4382
Therefore, the area under the standard normal curve between z = 0 and z = 1.53 is approximately 0.4382.

3. Why normal distribution called symmetric?
A normal distribution comes with a perfectly symmetrical shape. This means that the distribution curve can be divided in the middle to produce two equal halves. The symmetric shape occurs when one-half of the observations fall on each side of the curve.

4. u = 1000, σ = 200, N = 2000, x = 700?

Z = (x - u) / σ = (700 - 1000)/ 200 = -1.5

P(X < 700) = P(Z < -1.5) = 1 - P(Z < 1.5) = 1 - 0.9332 = 0.0668

The probability that a bulb will fail in the first 700 burning hours is 6.7% (app.)

5. u = 10, x = 7, m = 1/10 = 0.1?

P(X>7) = 1 - 1 + e ^ -mx = e ^ -mx

= e ^ (-0.1)(7) = 0.4966

The probability that a computer will last more than 7 years is 50% (app.)

6. What is the pdf of Log- Normal distribution?

In probability theory, a log-normal (or lognormal) distribution is a continuous probability distribution of a random variable whose logarithm is normally distributed. Thus, if the random variable X is log-normally distributed, then Y = ln(X) has a normal distribution.

7. Suppose that the reaction time in seconds of a person can be modeled by a lognormal distribution with parameter values, mean = -0.35 and sd = 0.2.?

mean = -0.35 and sd = 0.2 $\quad\quad$ $\ln X \sim N(-0.35, 0.2^2)$

a)

$P(X<0.6) = P((\ln X) < \ln(0.6))$

$= P(Z < \ln(0.6) - (-0.35) / 0.2) = P(Z < -0.8)$

$= 1- 0.7881 = 0.2119$

The probability that the reaction time is less than 0.6 seconds is 21.2 % (app.)

b)

$P(X<x) = 0.05$

$P(\ln X< \ln x) = 0.05$

$P(Z < \ln(x) - (-0.35) / 0.2) = 0.05$

$(\ln(x) - (-0.35) / 0.2) = Z\ 0.05$

$\ln(x) = -1.645 * 0.2 - 0.35$

x = 0.507 seconds

The reaction time that is exceeded by 95% of the population is 0.507 seconds (app.)

8. β = 1.5 and a scale parameter η = 100.0 hours, x = 25 hours?

$P(X < 25) = 1 - e^{-(25/100)\ 1.5}$

$= 1 - e^{-0.125} = 0.118$

the probability that the item fails before achieving a life of 25 hours is 11.8 % (app.)