* Log Normal Distribution :

→ It is right skewed continous probability distribution, meaning it has long tail towards right.

→ It is continous probability distribution of a random variable whose logarithm is normally distributed.

→ Also known as 'Galtons distribution'

- For any random variabe 'x' can be transformed to log normal distribution by calculating its natural log.
- Similarly log normal distribution can be inverse transformed to original form by calculating exponent of the data points of log normal distribution.

$x \in$ Any Distribution (μ, σ)

Transformation

$y \in$ Log Normal Distribution (μ, σ^2)

→ $PDF = \frac{1}{x \sigma \sqrt{2\pi}} e^{\left(\frac{-[\ln(x) - \mu]^2}{2\sigma^2}\right)}$

→ x to y called transformation.

→ y to x called inverse transformation.

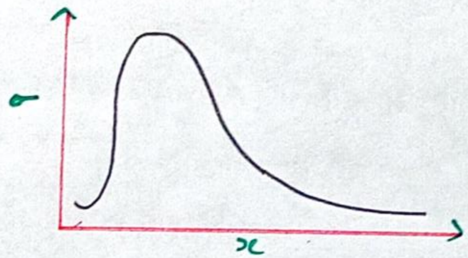
→ Transformation: If the random variable x of any distribution converted to Normal log distribution, then value of the x on new distribution is y.

$$\boxed{y = \ln(x)}$$

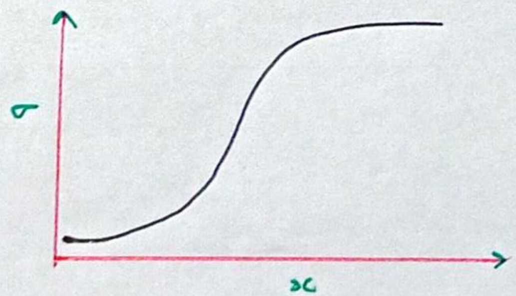
→ Inverse Transformation: If the random variable y of log normal distribution converted back to original distribution, then value of y on new distribution is x.

$$\boxed{x = \exp(y)}$$ [antilog]

→ Log normal Distribution (PDF)



→ Log Normal Distribution (CDF)



→ For log normal distribution,

$$\boxed{\text{Mean } (\mu) = \exp\left(\mu + \frac{\sigma^2}{2}\right)}$$

$$\boxed{\text{Median} = \exp(\mu)}$$

$$\boxed{\text{Mode} = \exp(\mu - \sigma^2)}$$

$$\boxed{\text{Variance} = [\exp(\sigma^2) - 1]\exp(2\mu + \sigma^2)}$$