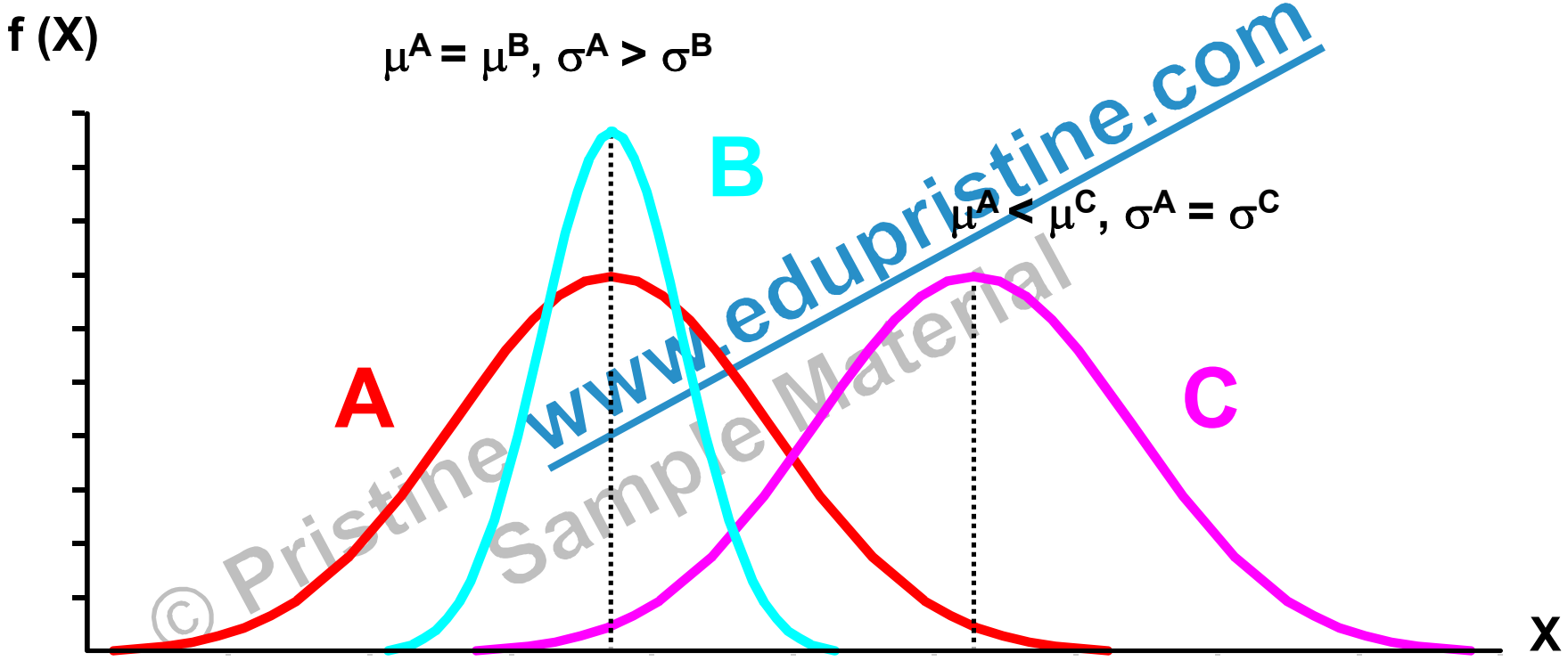
PRISTINE

Quantitative Methods - II

Normal Distribution

- Normal distribution is a continuous, symmetric probability distribution that is completely described by two parameters: its mean, μ, and its variance, σ^2.
- General Normal random variable – $X \sim N(\mu, \sigma^2)$
  - The normal distribution is said to be bell-shaped with the mean showing its central location and the variance showing its "spread".
  - A linear combination of two or more Normal random variables is also normally distributed.
- Standard Normal distribution – $Z \sim N(0, 1)$.
  - Is a Normal distribution with mean $\mu=0$, and variance $\sigma^2=1$.

Effect of Varying Parameters (μx & σx)



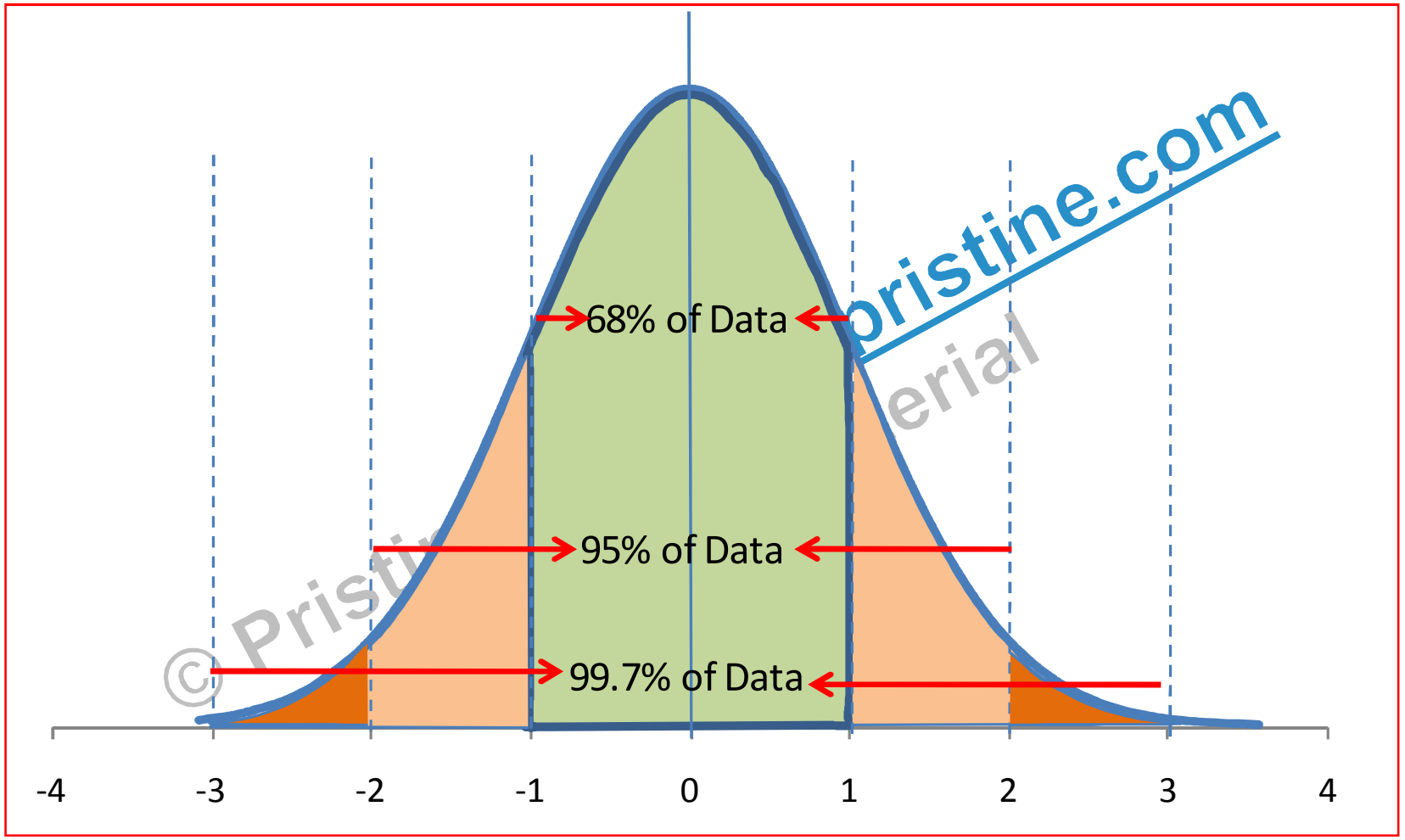
Normal Distribution Random Variable

- General Normal random variable $X \sim N(\mu, \sigma^2)$
  - X can be standardized to a Standard Normal random variable.
  - Resulting variable has mean zero and variance equal to 1.

$$Z = \frac{X - \mu}{\sigma}$$

- Calculating probabilities for a normal random variable:
  - $X \sim N(\mu, \sigma^2)$ taking on a range of specified values, say $a < X < b$, directly as the area under the normal curve using the cumulative Normal distribution function as:
- $N(a < X < b | \mu, \sigma^2) = N(X < b | \mu, \sigma^2) - N(X < a | \mu, \sigma^2)$.
  - You should be able to show what this looks like using a diagram of the Normal distribution.

Standard Normal Distribution



The standard normal distribution has mean = 0 and standard deviation sigma=1