

Most Important

Sprob

Normal Distribution:-

Introduction - Applications (Normal distribution) } Assignment

Introduction - Applications (Hypothesis testing) }

Central tendency \rightarrow Mean = ?Dispersion \rightarrow Variance = ?Skewness $\rightarrow \gamma_1 = 0$ Kurtosis $\rightarrow \gamma_2 = 0$

Symmetric data

Normal curve

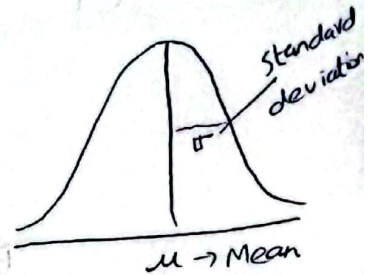


Normal data

Normal probability function

$$f(x; \mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}$$

$$-\infty < \mu < \infty$$



The marks of MTH262 is normally distributed with mean 65 and variance is 100. Find the probability that the marks of a student will be between 70 to 80.

$$X \sim N(\mu, \sigma^2)$$

$$E(X) = \mu$$

$$\text{Var}(X) = \sigma^2$$

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

$$Z \sim N(0, 1)$$

$$E(Z) = \frac{E(X) - \mu}{\sigma}$$

$$= \frac{\mu - \mu}{\sigma} = 0$$

Standard Normal variable

$$V(Z) = \frac{V(X) - 0}{\sigma^2}$$

$$V(Z) = \frac{\sigma^2}{\sigma^2} = 1$$

X: marks of student

$$X \sim N(65, 100)$$

$$P[70 \leq X \leq 80] = P[0.5 \leq Z \leq 1.5]$$

$$Z = \frac{X - 65}{10}$$

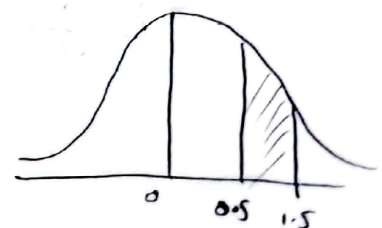
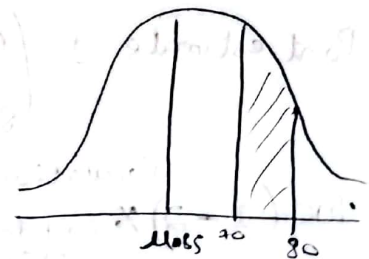
$$\rightarrow P[Z < 1.5] - P[Z < 0.5]$$

$$\text{At } X = 70$$

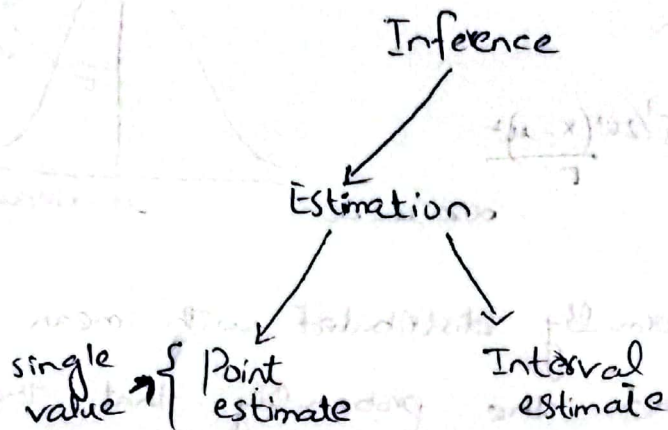
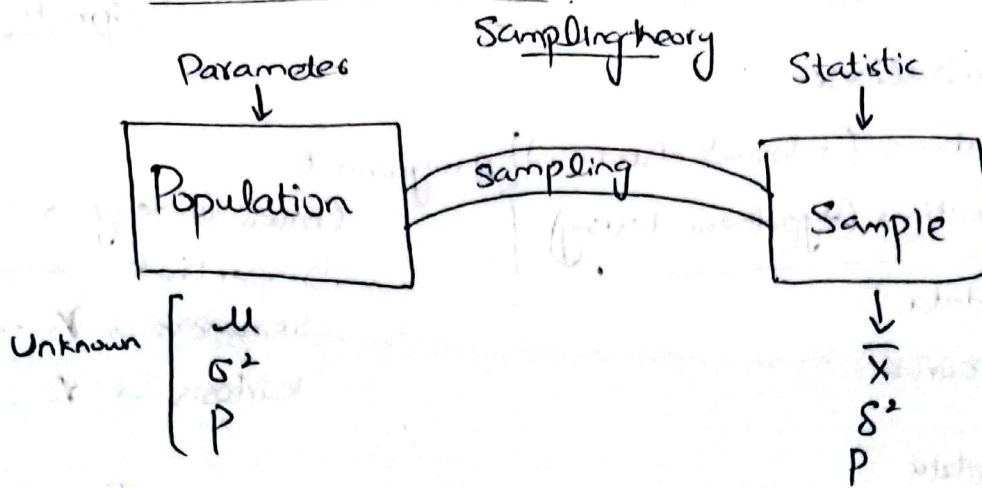
$$Z = \frac{70 - 65}{10} = \frac{5}{10} = 0.5$$

$$\text{At } X = 80$$

$$Z = \frac{80 - 65}{10} = 1.5$$



Statistical Inference:



$$\bar{X} = \frac{\sum x}{n} = 71$$

estimator \rightarrow estimate

- $\rightarrow \bar{X}$ is a point estimate of μ
- $\rightarrow s^2$ is a point estimate of σ^2
- $\rightarrow p$ is a point estimate of p

\Rightarrow Interval estimation

Point estimate \pm Margin of error

Point estimate \pm (Reliability of coefficient
standard error of point estimate)

Population is a normal
100(1 - α)% confident interval for μ

$$\bar{X} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$\text{Bias}(\bar{X}) = 0$$

unbias

$$E(\bar{X}) = \mu$$

$$\text{MSE}(\bar{X}) = 0$$

$$\text{Var} \rightarrow x$$

Mean square error \rightarrow MSE \rightarrow

standard error \rightarrow SE \rightarrow