

Probability and Statistics Formula Sheet

UNIT 1: DESCRIPTIVE STATISTICS

Mean (\bar{x}): $\bar{x} = \sum x / n$

Weighted Mean: $\bar{x}_w = \sum wx / \sum w$

Median (Grouped): $\text{Median} = L + [(n/2 - F) / f] \cdot h$

Mode (Grouped): $\text{Mode} = L + [(f_1 - f_0) / (2f_1 - f_0 - f_2)] \cdot h$

Range = Max - Min

Population Variance (σ^2): $\sigma^2 = (\sum x^2) / N$

Sample Variance (s^2): $s^2 = (\sum x^2) / (n - 1)$

Std Deviation: σ or $s = \sqrt{s^2}$

CV = $(s / \bar{x}) \cdot 100\%$

IQR = $Q_3 - Q_1$

UNIT 2: PROBABILITY THEORY

$P(E)$ = Favorable outcomes / Total outcomes

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cap B) = P(A) \cdot P(B)$ (if independent)

Conditional $P(A|B) = P(A \cap B) / P(B)$

Bayes Theorem: $P(A|B) = [P(B|A) \cdot P(A)] / P(B)$

Permutations: $nPr = n! / (n - r)!$

Combinations: $nCr = n! / [r!(n - r)!]$

UNIT 3: SAMPLING DISTRIBUTIONS

Mean of Sampling Dist.: $\mu_{\bar{x}} = \mu$

Std Error (known): $\sigma_{\bar{x}} = \sigma / \sqrt{n}$

Std Error (s used): $SE = s / \sqrt{n}$

Central Limit Theorem: As $n \rightarrow \infty$, distribution of \bar{x} Normal

Probability and Statistics Formula Sheet

UNIT 4: SIGNIFICANCE TESTINGS

Z-test: $z = (\bar{x} - \mu) / (\sigma / \sqrt{n})$

T-test: $t = (\bar{x} - \mu) / (s / \sqrt{n})$

Confidence Interval: $\bar{x} \pm z^* (\sigma / \sqrt{n})$ or $\bar{x} \pm t^* (s / \sqrt{n})$

Chi-square: $\chi^2 = \sum [(O - E)^2 / E]$

UNIT 5: CORRELATION & REGRESSION

Pearsons r: $r = [nxy - \sum x \sum y] / [(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)]$

Regression Line: $y = a + bx$

Slope: $b = [nxy - \sum x \sum y] / [n\sum x^2 - (\sum x)^2]$

Intercept: $a = \bar{y} - b\bar{x}$

Coefficient of Determination: $R^2 = r^2$