STATISTICS FORMULAS

MEAN (AVERAGE)

Mean (Average): $\frac{\sum x}{n}$

Weighted Mean: $\frac{\sum wx}{\sum w}$

Median: Middle value

Mode: Most frequent value

Range: Max – Min

Population Variance: $\sigma^2 = \frac{\sum (x-\mu)^2}{N}$

SAMPLE VARIANCE

Sample Variance: $s^2 = \frac{\sum (x-\bar{x})^2}{n-1}$

Standard Deviation: $\sigma = \sqrt{\text{Variance}}$

Z Score: $z = \frac{x-\mu}{\sigma}$

Percentile: $\left(\frac{\text{Number below}}{\text{Total}}\right) \times 100$

Quartiles: Q1, Q2, Q3

Interquartile Range: IQR = Q3 – Q1

OUTLIER RULE

Outlier Rule: $< Q1 - 1.5IQR$ or $> Q3 + 1.5IQR$

Empirical Rule: 68%–95%–99.7%

Probability: $P(A) = \frac{\text{Favorable}}{\text{Total}}$

Complement Rule: $P(A') = 1 - P(A)$

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

Multiplication Rule: $P(A \cap B) = P(A)P(B$

CONDITIONAL PROBABILITY

Conditional Probability:

P(A; Bayes Theorem: $P(A$

Permutation: ${}_nP_r = \frac{n!}{n!(n-r)!}$

Combination: ${}_nC_r = \frac{n!}{r!(n-r)!}$

Expected Value: $E(X) = \sum xP(x)$

Variance (Discrete): $\sum (x-\mu)^2 P(x)$

BINOMIAL PROBABILITY

Binomial Probability: ${}_nC_r\, p^r\, (1-p)^{n-r}$

Normal Distribution: $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma^2}$

Standard Normal: $z = \frac{x-\mu}{\sigma}$

Standard Error: $\frac{\sigma}{\sqrt{n}}$

Confidence Interval: $\bar{x} \pm Z\left(\frac{\sigma}{\sqrt{n}}\right)$

Margin of Error: $Z\left(\frac{\sigma}{\sqrt{n}}\right)$

CORRELATION COEFFICIENT

Correlation Coefficient: r

Regression Line: $y = mx + c$

Slope (Regression): $m = \frac{r\sigma_y}{\sigma_x}$

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

Chi-Square: $\frac{\sum (O-E)^2}{E}$

t-Test: $\frac{\bar{x}-\mu}{s/\sqrt{n}}$

F-TEST

F-Test: $\frac{\text{Variance}_1}{\text{Variance}_2}$