Mathematical Formulae

1. Simple interest (I) is:

$$I = P \times R \times T$$

2. The maturity value (M) of the principal is:

$$\begin{aligned} M &= P + I \\ M &= P(1 + R \times T) \end{aligned}$$

3. The amount of principal (P) required is:

$$P = \frac{M}{1 + R \times T}$$

4. The compound interest formula for the accumulated value (M) is:

$$M = P(1 + i)^n$$

5. The present value (P) at compound interest of an amount M is:

$$P = M(1 + i)^{-n}$$

6. The compound interest rate (i) per period is:

$$i = \left(\frac{M}{P}\right)^{\frac{1}{n}} - 1$$

7. The number of periods (n) required for an amount of P to accumulate to an amount of M, when the compound interest rate is i per period, is:

$$n = \frac{\log\left(\frac{M}{P}\right)}{\log(1 + i)}$$

8. The future value (S) of annuity is:

$$S = R \times \frac{(1 + i)^n - 1}{i}$$

9. The present value (A) of annuity is:

$$A = R \times \left[\frac{1 - (1 + i)^{-n}}{i}\right]$$

10. The amount of the annuity payment (R) made per period is:

$$R = \frac{S}{\frac{(1+i)^n - 1}{i}}$$

11. The amount of the annuity payment (R) made per period is:

$$R = \frac{A}{\frac{1-(1+i)^{-n}}{i}}$$

12. Net profit (P) is:

$$P = \text{ Income – Cost } = I - C$$

13. The total cost (C) is:

$$C = \text{Variable cost} + \text{Fixed Cost}$$

14. Break-even volume (x) is:

$$x = \frac{f}{s - v}$$

15. Net profit (P) is:

$$P = I - C = sx - (f + vx) = (s - v)x - f$$

Statistical Formulae

1. The arithmetic mean ($\bar{x}$) of a set of n observations is:

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

2. If each x-value in a set of observations is assigned a corresponding weight (w), the weighted arithmetic mean is:

$$\bar{x} = \frac{\sum xw}{\sum w}$$

3. Range = largest observation - smallest observation

4. Interquartile range = Q3 – Q1

5. A standard score is defined as:

$$\text{Standard score} = z = \frac{\text{observed value} - \text{mean}}{\text{standard deviation}}$$

6. The standard score (z) of an observation x from a population with mean μ and standard deviation σ is:

$$z = \frac{x - \mu}{\sigma}$$

7. To convert a standard score z to a raw score x, for a distribution with mean μ and standard deviation σ use:

$$x = \mu + z\sigma$$

8. To convert a mean of $\bar{x}$ to a z-score use:

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

9. If σ is known:

$$\text{Standard error of the mean } = \frac{\sigma}{\sqrt{n}}$$

10. If σ is unknown and n is large:

$$\text{Standard error of the mean } = \frac{s}{\sqrt{n}}$$

11. If σ is known and the population is Normal, a confidence interval for μ is:

$$\left(\bar{x} - z\frac{\sigma}{\sqrt{n}}\ ,\ \bar{x} + z\frac{\sigma}{\sqrt{n}}\right)$$

12. If σ is known, n is large, but the population distribution is unknown or not Normal, a confidence interval for μ is:

$$\left(\bar{x} - z\frac{\sigma}{\sqrt{n}}\ ,\ \bar{x} + z\frac{\sigma}{\sqrt{n}}\right)$$

13. If σ is unknown and n is large, a confidence interval for μ is:

$$\left(\bar{x} - z\frac{s}{\sqrt{n}}\ ,\ \bar{x} + z\frac{s}{\sqrt{n}}\right)$$

14. The sample size required for a specified confidence z and error e

$$n \geq \frac{z^2\sigma^2}{e^2}$$

Use s if σ is unknown.

15. Common z values are:

For a 90% interval, use $z = 1.645$

For a 95% interval, use $z = 1.96$

For a 99% interval, use $z = 2.58$

16. The formula for a one-sample z-test statistic where σ is known is:

$$z = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

17. The formula for a one-sample z-test statistic where σ is unknown and n is large is:

$$z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

18. The population least-squares regression line is denoted by:

$$\hat{y} = \alpha + \beta x$$

where α and β are constants

19. The sample least-squares regression line is denoted by:

$$\hat{y} = a + bx$$

where a and b are constants