

Formula Sheet

1. Compound Amount: $S = P(1 + r)^n$

2. Present value $P = S(1 + r)^{-n}$

3. Effective rate: $r_e = \left(1 + \frac{r}{n}\right)^n - 1$

4. Continuous compound amount $S = Pe^{rt}$

5. Continuous effective rate $r_e = e^r - 1$

6. Net present value = sum of present values of the cash flow – Initial investment

7. Annuity (Ordinary)

a. Present value of annuity

$$A = R \cdot \frac{1 - (1 + r)^{-n}}{r} = R \cdot a_{\overline{n}|r}$$

b. Amount of annuity (Future value) :

$$S = R \cdot \frac{(1 + r)^n - 1}{r} = R \cdot S_{\overline{n}|r}$$

8. Annuity (Due)

a. Present value of annuity

$$A = R \cdot \left[1 + \frac{1 - (1 + r)^{-(n-1)}}{r} \right] = R \cdot \left[1 + a_{\overline{n-1}|r} \right]$$

b. Amount of annuity (Future value) :

$$S = R \cdot \left[\frac{(1 + r)^{n+1} - 1}{r} - 1 \right] = R \cdot \left[S_{\overline{n+1}|r} - 1 \right]$$

9. $nPr = \frac{n!}{(n-r)!}$, $n! = n(n-1)(n-2)\cdots(2)(1)$, $0! = 1$, $1! = 1$

10. $nCr = \frac{n!}{r!(n-r)!}$

11. Demorgan's Laws: $(E \cap F)^c = E^c \cup F^c$,

$$(E \cup F)^c = E^c \cap F^c$$

12. For equiprobable sample space S;

$$P(E) = \frac{\#(E)}{\#(S)}$$

13. $P(E \cup F) = P(E) + P(F) - P(E \cap F)$

14. Odds in favor of the event E occurring are:

$$\frac{P(E)}{P(E^c)}$$

15. Conditional Probability:

$$P(E|F) = \frac{P(E \cap F)}{P(F)}, P(F) \neq 0$$

16. $a_{\overline{5}|0.04} = 4.451822$, $a_{\overline{2}|0.04} = 1.886095$,

$$S_{\overline{5}|0.04} = 4.451822$$
, $S_{\overline{2}|0.04} = 2.040000$

17. For observations

a. The Variance formula

$$S^2 = \frac{\sum(x - \bar{x})^2}{n - 1} = \frac{\sum x^2 - n(\bar{x})^2}{n - 1}$$

The standard deviation is $S = +\sqrt{S^2}$

b. Sample mean $\bar{X} = \frac{\sum X}{n}$

18. For frequency table

a. The mean $\bar{X} = \frac{\sum X f_i}{n}$, $n = \sum f_i$

b. Variance

$$S^2 = \frac{\sum x^2 f_i - n(\bar{x})^2}{n - 1}$$

The standard deviation is $S = +\sqrt{S^2}$

19. The expected value for a r.v. X is:

$$\mu = E(X) = \sum x f(x)$$

20. The variance for a r.v. X is

$$\sigma^2 = \sum (x - \mu)^2 f(x) \text{ or}$$

$$\sigma^2 = E(X^2) - \mu^2$$

$$= \sum x^2 f(x) - \mu^2$$

The standard deviation is $\sigma = +\sqrt{\sigma^2}$

21. The Binomial distribution

$$P(X = x) = f(x) = nC_x \cdot p^x \cdot q^{n-x}, q = 1 - p$$

The mean = $n \cdot p$

The Variance = $n \cdot p \cdot q$

22. the standardized formula for the normal

distribution is: $Z = \frac{X - \mu}{\sigma}$