Binomial Theorem Formulas

1) $(x + y)^n = {}^nC_0\, x^n y^0 + {}^nC_1\, x^{n-1} y^1 + {}^nC_2\, x^{n-2}\, y^2 + \ldots + {}^nC_{n-1}\, x^1 y^{n-1} + {}^nC_n\, x^0 y^n$

2) $T_{r+1} = {}^nC_r\, p^{n-r} q^r$, where T_{r+1} = general term of the binomial expansion

3) $(1 + a)^{-2} = 1 - 2a + 3a^2 - 4a^3 +$ and so on

4) $(1 + a)^{-3} = 1 - 3a + 6a^2 - 10a^3 + 15a^4 +$ and so on

5) $(1 - a)^{-1} = 1 + a + a^2 + a^3 + a^4 + a^5 +$ and so on

6) $(1 - a)^{-2} = 1 + 2a + 3a^2 + 4a^3 +$ and so on

7) $(1 - a)^{-3} = 1 + 3a + 6a^2 + 10a^3 + 15a^4 +$ and so on

8) $(1 + x)^n = {}^n\Sigma_{r-0}\, nC_r \cdot x^r = [C_0 + C_1\, x + C_2\, x^2 + \ldots C_n\, x_n]$

9) $(1+x)^n + (1 - x)^n = 2[C_0 + C_2\, x^2 + C_4\, x^4 + \ldots]$

10) $(1+x)^n - (1-x)^n = 2[C_1\, x + C_3\, x^3 + C_5\, x^5 + \ldots]$

11) $(x + y)^n - (x-y)^n = 2[C_1\, x^{n-1}\, y + C_3\, x^{n-3}\, y^3 + C_5\, x^{n-5}\, y^5 + \ldots]$

12) $(x + y)^n + (x-y)^n = 2[C_0\, x^n + C_2\, x^{n-1}\, y^2 + C_4\, x^{n-4}\, y^4 + \ldots]$