

## 2.2 Product Formulas

Real numbers:  $a, b, c$

Whole numbers:  $n, k$

$$73. \quad (a - b)^2 = a^2 - 2ab + b^2$$

$$74. \quad (a + b)^2 = a^2 + 2ab + b^2$$

$$75. \quad (a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$76. \quad (a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$77. \quad (a - b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$$

$$78. \quad (a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

### 79. Binomial Formula

$$(a + b)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1}b + {}^nC_2 a^{n-2}b^2 + \dots + {}^nC_{n-1} ab^{n-1} + {}^nC_n b^n,$$

where  ${}^nC_k = \frac{n!}{k!(n-k)!}$  are the binomial coefficients.

$$80. \quad (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$$

$$81. \quad (a + b + c + \dots + u + v)^2 = a^2 + b^2 + c^2 + \dots + u^2 + v^2 + \\ + 2(ab + ac + \dots + au + av + bc + \dots + bu + bv + \dots + uv)$$