

2.2 Product Formulas

Real numbers: a, b, c

Whole numbers: n, k

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

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

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

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

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

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

79. Binomial Formula

$$(a + b)^n = {}^nC_0a^n + {}^nC_1a^{n-1}b + {}^nC_2a^{n-2}b^2 + \dots + {}^nC_{n-1}ab^{n-1} + {}^nC_nb^n,$$

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

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

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

