Arithmetic Calculation

———— Addition ————

$$-5 + 3 = -2$$

$$-3.2 + 1.6 = -1.6$$

$$0.1 + 0.1 = 0.2$$

$$0.24 + 0.36 = 0.6$$

$$-12 + 2.3 + 3.45 = -6.25$$

———— Subtraction ————

$$2.3 - 1.2 = 1.1$$

$$0.1 - 0.1 = 0$$

$$0.5 - 0.72 = -0.22$$

$$3.2 - 1.6 = 1.6$$

$$7.5 - 1.6 - 2.1 = 3.8$$

$$10 - 73 - 28 = -91$$

———— Multiplication ————

$$1.2 \times (-2.3) = -2.76$$

$$0.1 \times 0 = 0$$

$$0.5 \times 0.5 = 0.25$$

$$3.2 \times 1.6 = 5.12$$

$$0.5 \times 0.7 = 0.35$$

$$-3.2 \times 1.6 \times 0.7 = -3.584$$

———— Division ————

$$3.7 \div (-1.4) = -2.643$$

$$2 \div 3 = 0.667$$

$$1 \div 3 = 0.333$$

$$10 \div 7 = 1.429$$

$$5.12 \div 1.6 = 3.2$$

$$(-5.12) \div 1.6 \div (-0.8) = 4$$

$$9 \div 3 \div 2 = 1.5$$

———— Arithmetic Calculation in General ————

$$(22 \times 12) \ + \ (486 \div 6) = 345$$

$$(8.63 + 7.05) \times (6.5 - 1.6) = 76.832$$

Combinatorics

———— Factorials ————

$$7! = 5040$$

———— Permutations ————

$$_9\mathrm{P}_4 = 3024$$

———— Combinations ————

$$_9\mathrm{C}_9 = 1,\ _9\mathrm{C}_8 = 9,\ _9\mathrm{C}_7 = 36,\ _9\mathrm{C}_6 = 84,\ _9\mathrm{C}_5 = 126,$$

$$_9\mathrm{C}_4 = 126,\ _9\mathrm{C}_3 = 84,\ _9\mathrm{C}_2 = 36,\ _9\mathrm{C}_1 = 9,\ _9\mathrm{C}_0 = 1$$

$$_{20}\mathrm{C}_0 = 1,\ _{20}\mathrm{C}_1 = 20,\ _{20}\mathrm{C}_2 = 190,\ _{20}\mathrm{C}_3 = 1140,\ _{20}\mathrm{C}_4 = 4845,\ _{20}\mathrm{C}_5 = 15504,_{20}\mathrm{C}_6 = 38760,$$

$$_{20}\mathrm{C}_7 = 77520,\ _{20}\mathrm{C}_8 = 125970,\ _{20}\mathrm{C}_9 = 167960,\ _{20}\mathrm{C}_{10} = 184756,\ _{20}\mathrm{C}_{11} = 167960,$$

$$_{20}\mathrm{C}_{12} = 125970,\ _{20}\mathrm{C}_{13} = 77520,\ _{20}\mathrm{C}_{14} = 38760,\ _{20}\mathrm{C}_{15} = 15504,\ _{20}\mathrm{C}_{16} = 4845,\ _{20}\mathrm{C}_{17} = 1140,$$

$$_{20}\mathrm{C}_{18} = 190,\ _{20}\mathrm{C}_{19} = 20,\ _{20}\mathrm{C}_{20} = 1$$

———— Binomial Expansion ————

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x-y)^2 = x^2 - 2xy + y^2$$

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x-y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$$

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

$$(\alpha+\beta)^9 = \alpha^9 + 9\alpha^8\beta + 36\alpha^7\beta^2 + 84\alpha^6\beta^3 + 126\alpha^5\beta^4 + 126\alpha^4\beta^5 + 84\alpha^3\beta^6 + 36\alpha^2\beta^7 + 9\alpha\beta^8 + \beta^9$$

$$(\alpha-\beta)^9 = \alpha^9 - 9\alpha^8\beta + 36\alpha^7\beta^2 - 84\alpha^6\beta^3 + 126\alpha^5\beta^4 - 126\alpha^4\beta^5 + 84\alpha^3\beta^6 - 36\alpha^2\beta^7 + 9\alpha\beta^8 - \beta^9$$