

Addition and Subtraction of polynomials

$$\begin{aligned} P(x) &= a_n x^n + \dots + a_1 x + a_0 \\ Q(x) &= b_m x^m + \dots + b_1 x + b_0 \end{aligned}$$

$$P(x) + Q(x) = (a_0 + b_0) + (a_1 + b_1)x + \dots + (a_i + b_i)x^i + \dots$$

① Simplify: $5(4x-8) - 3(8x-8)$

$$\begin{aligned} &= 20x - 40 - (24x - 24) \\ &= 20x - 40 - 24x + 24 \\ &= (20-24)x - 40+24 \\ &= -4x - 16 \end{aligned}$$

②

$$\begin{array}{r} A = x^2 - 6x + 10 \\ B = 3x^3 - 7x^2 + x + 1 \\ \hline A+B = 3x^3 - 6x^2 - 5x + 11 \end{array}$$

③ $P(x) = 3x^2 - 5x \left(5x+8 - (8-5x^2 + (8x^2 - x + 1)) \right)$

$$\begin{aligned} \bullet \quad 8 - 5x^2 + (8x^2 - x + 1) &= 8+1 - x - 5x^2 + 8x^2 \\ &= 9 - x + 3x^2 \end{aligned}$$

$$\begin{aligned} \bullet \quad 5x+8 - (9 - x + 3x^2) &= 8-9 + 5x+x - 3x^2 \\ &= -1 + 6x - 3x^2 \end{aligned}$$

$$\begin{aligned} \bullet \quad P(x) &= 3x^2 - 5x(-1 + 6x - 3x^2) \\ &= 3x^2 + 5x - 30x^2 + 15x^3 \\ &= 15x^3 - 27x^2 + 5x \end{aligned}$$