Multiplication of polynomials

Law of exponents: $x^a \cdot x^b = x^{a+b}$ $\quad (x^a)^b = x^{a \cdot b}$

Distributivity property: $\alpha(x + x_0) = \alpha \cdot x + \alpha \cdot x_0$.

Product forms: $(a \pm b)^2 = a^2 \pm 2ab + b^2$.

$(a - b)(a + b) = a^2 - b^2$

① Simplify $(5x - 6)(2x - 3)$

$= 5x(2x - 3) - 6(2x - 3)$

$= (5x)(2x) - (5x)(3) - 6(2x) - 6(-3)$

$= 10x^2 - 15x - 12x + 18$.

$= 10x^2 - 27x + 18$

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

$= 2^2(x^2)^2 + 12x^2y^2 + 3^2(y^2)^2$

$= 4x^4 + 12x^2y^2 + 9y^4$

③ $-2(2 - 6x)(-x - 1) + 5x^2 - 10x + 3$.

$= -2[2(-x) + 2(-1) - 6x(-x) - 6x(-1)] + 5x^2 - 10x + 3$

$= -2[-2x - 2 + 6x^2 + 6x] + 5x^2 - 10x + 3$.

$= -8x + 4 - 12x^2 + 5x^2 - 10x + 3$.

$= -7x^2 - 18x + 7$.

④ $(2x - 1)(x - 4)(x + 4)$

$= (2x - 1)(x^2 - 4^2)$.

$= 2x \cdot x^2 - 32x - x^2 + 16$.

$= 2x^3 - x^2 - 32x + 16$.