

$$1. 3x^n + 9x^{2n} + 12x^{3n} = 3x^n (1 + 3x^n + 4x^{2n})$$

$$2. a^5b^3 + a^2b^3 - 2a^5 - 2a^2 = a^2(a^3b^3 + b^3 - 2a^3 - 2) = a^2[b^3(a^3 + 1) - 2(a^3 + 1)] = a^2(a^3 + 1)(b^3 - 2)$$

$$3. (x - y)^2 + a(x - y) + bx - by = (x - y)^2 + a(x - y) + b(x - y) = (x - y)(x - y + a + b)$$

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

$$5. -x^2 + 2x - 1 = -(x^2 - 2x + 1) = -(x - 1)^2$$

$$6. 4x^2 + 9y^2 + z^2 + 12xy - 4xz - 6yz = (2x + 3y - z)^2$$

$$7. (x + 2y)^3 - 3y(x + 2y)^2 + 2y^2(x + 2y) = (x + 2y)[(x + 2y)^2 - 3y(x + 2y) + 2y^2] = \\ = (x + 2y)(x^2 + 4xy + 4y^2 - 3xy - 6y^2 + 2y^2) = (x + 2y)(x^2 + xy) = x(x + 2y)(x + y)$$

$$8. (a + b)^2 + 2(a + b) + 1 = (a + b + 1)^2$$

$$9. 0,09x^8 - 0,12x^4y^3 + 0,04y^6 = (0,3x^4 - 0,2y^3)^2$$

$$10. x^7 + 6x^5 + 9x^3 = x^3(x^4 + 6x^2 + 9) = x^3(x^2 + 3)^2$$