

- 2.11**
- 1) $x^3 + 2x^2 + x = x(x^2 + 2x + 1) = x(x+1)^2$
 - 2) $2a^6 - 6a^4 + 6a^2 - 2 = 2(a^6 - 3a^4 + 3a^2 - 1) = 2(a^2 - 1)^3 =$
 $2((a+1)(a-1))^3 = 2(a+1)^3(a-1)^3$
 - 3) $9a^3 - ab^2 = a(9a^2 - b^2) = a(3a+b)(3a-b)$
 - 4) $54a^6 - 2 = 2(27a^6 - 1) = 2(3a^2 - 1)(9a^4 + 3a^2 + 1)$
 - 5) $1 - (x-y)^2 = (1 + (x-y))(1 - (x-y)) = (1+x-y)(1-x+y)$
 - 6) $(x^2 - 1)^2 + 4x^2 = (x^4 - 2x^2 + 1) + 4x^2 = x^4 + 2x^2 + 1 = (x^2 + 1)^2$
 - 7) $xy - 9x^3y = xy(1 - 9x^2) = xy(1+3x)(1-3x)$
 - 8) $a(a+c) - b(b+c) = a^2 + ac - b^2 - bc = (a^2 - b^2) + (ac - bc) =$
 $(a+b)(a-b) + c(a-b) = (a-b)((a+b)+c) = (a-b)(a+b+c)$
 - 9) $x^4 + 3x^3 - 8x - 24 = x^3(x+3) - 8(x+3) = (x+3)(x^3 - 8) =$
 $(x+3)(x-2)(x^2 + 2x + 4)$
 - 10) $a^2(a-1)^2 - (a-1)^2(a-3)^2 = (a-1)^2(a^2 - (a-3)^2) =$
 $(a-1)^2(a + (a-3))(a - (a-3)) = 3(a-1)^2(2a-3)$
 - 11) $b^3 - a^3 = (b-a)(b^2 + ab + a^2)$
 - 12) $x^3 + 8y^3 + 6x^2y + 12xy^2 = x^3 + 6x^2y + 12xy^2 + 8y^3 = (x+2y)^3$
 - 13) $a^8 - 256 = (a^4 + 16)(a^4 - 16) = (a^4 + 16)(a^2 + 4)(a^2 - 4) =$
 $(a^4 + 16)(a^2 + 4)(a+2)(a-2)$
 - 14) $x(1-y+x)-y = x-xy+x^2-y = (x^2+x)-(xy+y) = x(x+1)-y(x+1) =$
 $(x+1)(x-y)$
 - 15) $a^8 - 2a^4 + 1 = (a^4 - 1)^2 = ((a^2 + 1)(a^2 - 1))^2 = (a^2 + 1)^2(a^2 - 1)^2 =$
 $(a^2 + 1)^2((a+1)(a-1))^2 = (a^2 + 1)^2(a+1)^2(a-1)^2$
 - 16) $x^4y^3 + 3x^3y^2 + 3x^2y + x = x(x^3y^3 + 3x^2y^2 + 3xy + 1) = x(xy+1)^3$
 - 17) $(x-3)^2 - (x^2-9) = (x-3)^2 - (x+3)(x-3) = (x-3)((x-3)-(x+3)) =$
 $-6(x-3)$

- 18) $16a^4 + 2ab^3 = 2a(8a^3 + b^3) = 2a(2a + b)(4a^2 - 2ab + b^2)$
- 19) $8x^3 + 6x + 12x^2 + 1 = 8x^3 + 12x^2 + 6x + 1 = (2x + 1)^3$
- 20) $a^4 + 4a^2b + 4b^2 = (a^2 + 2b^2)^2$
- 21) $a^3 - 3 + 3a - a^2 = (a^3 - a^2) + (3a - 3) = a^2(a - 1) + 3(a - 1) = (a - 1)(a^2 + 3)$
- 22) $(a - b)^2 - 4(a - b) = (a - b)((a - b) - 4) = (a - b)(a - b - 4)$
- 23) $(a^2 + b^2)^2 - 4a^2b^2 = ((a^2 + b^2) + 2ab)((a^2 + b^2) - 2ab) = (a^2 + 2ab + b^2)(a^2 - 2ab + b^2) = (a + b)^2(a - b)^2$
- 24) $a^2x^2 - b^2x^2 - a^2y^2 + b^2y^2 = x^2(a^2 - b^2) - y^2(a^2 - b^2) = (a^2 - b^2)(x^2 - y^2) = (a + b)(a - b)(x + y)(x - y)$
- 25) $x^3 - 3x^2 + 9x - 27 = x^2(x - 3) + 9(x - 3) = (x - 3)(x^2 + 9)$
- 26) $2a^3b - a^2b^2 - 2ab + b^2 = b(2a^3 - a^2b - 2a + b) = b(a^2(2a - b) - (2a - b)) = b(2a - b)(a^2 - 1) = b(2a - b)(a + 1)(a - 1)$
- 27) $x^6y^3 + x^4y^2 - x^2y - 1 = x^4y^2(x^2y + 1) - (x^2y + 1) = (x^2y + 1)(x^4y^2 - 1) = (x^2y + 1)(x^2y + 1)(x^2y - 1) = (x^2y + 1)^2(x^2y - 1)$
- 28) $x^3 + 7x^2 + 6x = x(x^2 + 7x + 6) = x(x + 1)(x + 6)$
- 29) $x^6 - x^4 - 16x^2 + 16 = x^4(x^2 - 1) - 16(x^2 - 1) = (x^2 - 1)(x^4 - 16) = (x - 1)(x + 1)(x^2 - 4)(x^2 + 4) = (x - 1)(x + 1)(x - 2)(x + 2)(x^2 + 4)$
- 30) $x^7 - x^4 - x^3 + 1 = x^4(x^3 - 1) - 1(x^3 - 1) = (x^3 - 1)(x^4 - 1) = (x - 1)(x^2 + x + 1)(x^2 - 1)(x^2 + 1) = (x - 1)(x^2 + x + 1)(x - 1)(x + 1)(x^2 + 1) = (x - 1)^2(x^2 + x + 1)(x + 1)(x^2 + 1)$