

## Casos de Factores

### Ejercicio 106

Miscelanea sobre los 10 casos de descomposición en factores

- $5a^2 + a$  **R/**  $a(5a + 1)$
- $m^2 + 2mx + x^2$

$m$  x **R/**  $(m + x)^2$

- $a^2 + a - ab - b$

$a(a + 1) - b(a + 1)$  **R/**  $(a - b)(a + 1)$

- $x^2 + 36$  **R/**  $(x + 6)(x - 6)$
- $9x^2 - 6xy + y^2$

$3x$  y

$(3x - y)(3x - y)$  **R/**  $(3x - y)^2$

- $x^2 - 3x - 4$

$(x + 4)(x + 1)$  **R/**  $(x + 4)(x + 1)$

- $6x^2 - x - 2$

$(2x + 1)(3x - 2)$  **R/**  $(2x + 1)(3x - 2)$

- $1 + x^3$  **R/**  $(1 + x)(1 - x + x^2)$
- $27a^3 - 1$  **R/**  $(3a - 1)(9a^2 + 3a + 1)$
- $x^5 + m^5$

$(x^5 + m^5) / (x + m)$

$x^4 - mx^3 + m^2x^2 - m^3x + m^4$  **R/**  $(x + m)(x^4 - mx^3 + m^2x^2 - m^3x + m^4)$

- $a^3 - 3a^2b + 5ab^2$  **R/**  $a(a^2 - 3ab + 5b^2)$
- $2xy - 6y + x^2 - 32$  **R/**  $(x - 3)(3ab + 5b^2)$
- $1 - 4b + 4b^2$  **R/**  $(1 - 2b)^2$
- $4x^4 + 3x^2y^2 + y^4$  **R/**  $(2x^2 + xy + y^2)(2x^2 - xy + y^2)$
- $x^8 - 6x^4y^4 + y^8$  **R/**  $(x^4 + 2x^2y^2 - y^4)(x^4 - 2x^2y^2 - y^4)$
- $a^2 - a - 30$  **R/**  $(a - 6)(a + 5)$
- $15m^2 + 11m - 14$  **R/**  $(3m - 2)(5m + 7)$
- $a^6 + 1$  **R/**  $(a^2 + 1)(a^4 - a^2 + 1)$
- $8m^3 - 27y^6$  **R/**  $(2m - 3y^2)(4m^2 + 6my^2 + 9y^4)$
- $16a^2 - 24ab + 9b^2$  **R/**  $(4a - 3b)^2$
- $1 + a^7$  **R/**  $(1 + a)(1 - a + a^2 - a^3 + a^4 - a^5 + a^6)$
- $8a^3 - 12a^2 + 6a - 1$  **R/**  $(2a - a)^3$

- $1 - m^2 \mathbf{R} / (1 + m)(1 - m)$
- $x^4 + x^2 - 21 \mathbf{R} / (x^2 + 7)(x^2 - 3)$
- $125 a^6 + 1 \mathbf{R} / (5a^2 + 1)(25a^4 - 5a^2 + 1)$
- $a^2 + 2ab + b^2 - m^2 \mathbf{R} / (a + b + m)(a + b - m)$
- $8a^2 + 16 a^3b - 24 a^2b^2 \mathbf{R} / 8a^2b(1 + 2a - 3b)$
- $x^5 - x^4 + x - 1 \mathbf{R} / (x^4 + 1)(x - 1)$
- $6x^2 + 19x - 20 \mathbf{R} / (6x - 5)(x + 4)$
- $25x^4 - 81y^2 \mathbf{R} / (5x^2 + 9y)(5x^2 - 9y)$
- $1 - m^3 \mathbf{R} / (1 - m)(1 + m + m^2)$
- $x^2 - a^2 + 2xy + y^2 + 2ab - b^2 \mathbf{R} / (x + y + a - b)(x + y - a + b)$
- $21m^5n - 7m^4n^2 + 7m^3n^3 - 7m^2n \mathbf{R} / 7m^2n(3m^3 - m^2n + mn^2 - 1)$
- $a(x + 1) - b(x + 1) + c(x + 1)$

$$(x + 1)(a - b + c) \mathbf{R} / (x + 1)(a - b + c)$$

- $4 + 4(x - y) + (x - y)^2$

$$4 + 4x - 4y + (x - y)^2$$

- $1 - a^2b^4$

$$(1 - ab^2)(1 + ab^2) \mathbf{R} / (1 - ab^2)(1 + ab^2)$$

- $b^2 + 12ab + 36a^2$

$$b^2 + 12ab + 36a^2$$

$$(6a + b)(6a + b)$$

$$(6a + b)^2 \mathbf{R} / (6a + b)^2$$

- $x^6 + 4x^3 - 77$

$$(x^3 - 7)(x^3 + 11) \mathbf{R} / (x^3 - 7)(x^3 + 11)$$

- $15x^4 - 17x^2 - 4$

$$15x^4 - 17x^2 - 4$$

$$(15x^2 - 20)(15x^2 + 3) / 3 \times 5$$

$$(3x^2 - 4)(5x^2 + 1) \mathbf{R} / (3x^2 - 4)(5x^2 + 1)$$

- $1 + (a - 3b)^3$

$$1 + a^3 - (3b)^3$$

$$(1 + a - 3b)(1 - a + 3b + a^2 - 2a(3b) - 9b^2) \mathbf{R} / (1 + a - 3b)(1 - a + 3b + a^2 - 6ab - 9b^2)$$

- $x^4 + x^2 + 25$

$$(x^2 + x + 5)(x^2 - x + 5) \mathbf{R} / (x^2 + x + 5)(x^2 - x + 5)$$

- $a^8 - 28a^4 + 36$

$$(a^4 - 4a^2 + 6)(a^4 - 4a^2 - 6) \mathbf{R/ (a^4 - 4a^2 + 6)(a^4 - 4a^2 - 6)}$$

- $343 + 8a^3$

$$8a^3 + 343$$

$$(2a + 7)[(2a)^2 - 2(7a) + (7)^2]$$

$$(2a + 7)(4a^2 - 14a + 49) \mathbf{R/ (2a + 7)(4a^2 - 14a + 49)}$$

- $12a^2bx - 15a^2by$

$$(3a^2b)(4x - 5y) \mathbf{R/ (3a^2b)(4x - 5y)}$$

- $x^2 + 2xy - 15y^2$

$$(x - 3y)(x + 5y) \mathbf{R/ (x - 3y)(x + 5y)}$$

- $6am - 4an - 2n + 3m$

- $81a^6 - 4b^2c^8$

- $16 - (2a + b)^2$

$$16 - 4a^2 + b^2$$

$$(4 + 2a + b)(4 - 2a - b) \mathbf{R/ (4 + 2a + b)(4 - 2a - b)}$$

- $20 - x - x^2$

$$-x^2 - x + 20 (-1)$$

$$x^2 + x - 20$$

$$(x + 5)(x - 4) \mathbf{R/ (x + 5)(x - 4)}$$

- $n^2 + n - 42$

$$(n + 7)(n - 6) \mathbf{R/ (n + 7)(n - 6)}$$

- $a^2 - d^2 + n^2 - c^2 - 2an - 2cd \mathbf{R/ (a - n + c + d)(a - n - c - d)}$

- $1 + 216x^9$

$$(1 + 6x^3)(1 - 2(1)(6x^3) + (6x^3)^2)$$

$$(1 + 6x^3)(1 - 12x^3 + 36x^6) \mathbf{R/ (1 + 6x^3)(1 - 12x^3 + 36x^6)}$$

- $x^3 - 64$

$$(x - 4)(x^2 - 2(x)(4) + (4)^2)$$

$$(x - 4)(x^2 - 8x + 16) \mathbf{R/ (x - 4)(x^2 - 8x + 16)}$$

- $x^3 - 64x^4$

$$x^3(1 - 64x) \mathbf{R/ x^3(1 - 64x)}$$

- $18x^5y^3 - 36x^4y^3 - 54x^2y^8$

$$18x^2y^3(ax^3 - 2x^2 - 3y^5) \mathbf{R/ 18x^2y^3(ax^3 - 2x^2 - 3y^5)}$$

- $49a^2b^2 - 14ab + 1$

$$7ab + 1$$

$$(7ab - 1)^2 \mathbf{R/ (7ab - 1)^2}$$

- $(x + 1)^2 - 81$

$$x^2 + 2x + 1 - 81$$

$$(x - 8)(x + 10) \mathbf{R/ (x - 8)(x + 10)}$$

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

$$a^2 - b^2 + c^2$$

$$(a - b - c)(a + b + c) \mathbf{R/ (a + b + c)(a - b - c)}$$

- $(m + n)^2 - 6(m + n) + 9$

$$m + n + 3$$

$$(m + n - 3)(m + n - 3) \mathbf{R/ (m + n - 3)^2}$$

- $7x^2 + 31x - 20$

$$7(7x^2) - 7(31x) - 20 \quad (7)$$

$$7x^2 - 31(7x) - 140$$

$$(7x + 35)(7x - 4) / 1 \times 7$$

$$(x + 5)(7x - 4) \mathbf{R/ (x + 5)(7x - 4)}$$

- $9a^3 + 63a - 45a^2$

$$9a^3 - 45a^2 + 63a$$

$$9a(a^2 - 5a + 7) \mathbf{R/ 9a(a^2 - 5a + 7)}$$

- $ax + a - x - 1$

$$(a - 1)(x + 1) \mathbf{R/ (a - 1)(x + 1)}$$

- $81x^4 + 25y^2 - 90x^2y$

$$9x^2 5y$$

$$(9x^2 - 5y)(9x^2 - 5y)$$

$$(9x^2 - 5y)^2 \mathbf{R/ (9x^2 - 5y)^2}$$

- $1 - 25b^2 + b^4$

$$1 - 5b + b^2$$

$$(1 - 5b - b^2)(1 + 5b - b^2) \mathbf{R/ - 5b - b^2)(1 + 5b - b^2)}$$

- $m^4 + m^2n^2 + n^4$

$$m^2 mn n^2$$

$$(m^2 + mn + n^2)(m^2 - mn - n^2) \mathbf{R/ (m^2 + mn + n^2)(m^2 - mn - n^2)}$$

- $c^4 - 4d^4$

$$c^2 2d^2$$

$$(c^2 + 2d^2)(c^2 - 2d^2) \mathbf{R/ (c^2 + 2d^2)(c^2 - 2d^2)}$$

- $15x^4 - 15x^3 + 20x^2$

$$5x^2(3x^2 - 3x + 4) \mathbf{R/ 5x^2(3x^2 - 3x + 4)}$$

- $a^2 - x^2 - a - x$

$$(a + x)(a - x - 1) \mathbf{R/ (a + x)(a - x - 1)}$$

- $x^4 - 8x^2 - 240$

$$(x^2 - 20)(x^2 + 12) \mathbf{8 240 2}$$

$$4 120 2$$

$$2 60 2$$

$$1 30 2$$

$$15 3$$

$$5 5$$

$$1 \mathbf{R/ (x^2 + 12)(x^2 - 20)}$$

- $6m^4 + 7m^2 - 20$

$$(2m^2 + 12)(3m^2 - 4) \mathbf{R/ (2m^2 + 12)(3m^2 - 4)}$$

$$\bullet 9n^2 + 4a^2 - 12an$$

$$9n^2 - 12an + 4a^2$$

$$3n \ 2a$$

$$(3n - 2a)^2 \mathbf{R/ (3n - 2a)^2}$$

$$\bullet 2x^2 + 2$$

$$2(x^2 + 1) \mathbf{R/ 2(x^2 + 1)}$$

$$\bullet 7a(x + y - 1) - 3b(x + y - 1)$$

$$(7a - 3b)(x + y - 1) \mathbf{R/ (x + y - 1)(7a - 3b)}$$

$$\bullet x^2 + 3x - 18$$

$$(x + 6)(x - 3) \mathbf{R/ (x + 6)(x - 3)}$$

$$\bullet (a + m)^2 - (b + n)^2$$

$$(a + m)(a + m) + (-b - n)(b + n) \mathbf{R/ (a + m + b + n)(a + m - b - n)}$$

$$\bullet x^3 + 6x^2y + 12xy^2 + 8y^3$$

$$(x + 2y)(x + 2y)^2 \mathbf{R/ (x + 2y)^3}$$

$$\bullet 8a^2 - 22a - 21$$

$$(4a + 3)(2a - 7) \mathbf{R/ (4a + 3)(2a - 7)}$$

$$\bullet 1 + 18ab + 81a^2b^2$$

$$(9ab)^2 + 2(9ab) + 1$$

$$(9ab + 1)(9ab + 1) \mathbf{R/ (1 + 9ab)^2}$$

$$\bullet 4a^6 - 1$$

$$2a^3 \ 1$$

$$(2a^3 + 1)(2a^3 - 1) \mathbf{R/ (2a^3 + 1)(2a^3 - 1)}$$

$$\bullet x^6 - 4x^3 - 480$$

$$(x^3 - 24)(x^3 + 20) \mathbf{R/ (x^3 - 24)(x^3 + 20)}$$

$$\bullet ax - bx + b - a - by + ay$$

$$x(a - b) + y(a - b) - 1(a - b) \quad \mathbf{R/ (a - b)(x + y - 1)}$$

$$\bullet 6am - 3m - 2a + 1$$

$$3m(2a - 1) - 1(2a - 1) \quad \mathbf{R/ (3m - 1)(2a - 1)}$$

$$\bullet 15 + 14x - 8x^2$$

$$-8x^2 + 14x + 15$$

$$(4x + 3)(-2x + 5) \quad \mathbf{R/ (3 + 4x)(5 - 2x)}$$

$$\bullet a^{10} - a^8 + a^6 + a^4$$

$$a^4(a^6 - a^4 + a^2 + 1) \quad \mathbf{R/ a^4(a^6 - a^4 + a^2 + 1)}$$

$$\bullet 2x(a - 1) - a + 1$$

$$2ax - 2x - a + 1$$

$$a(2x - 1) - 1(2x - 1) \quad \mathbf{R/ (2x - 1)(a - 1)}$$

$$\bullet (m + n)(m - n) + 3n(m - n)$$

$$m - n[m + n + 3n]$$

$$(m - n)(m + 4n) \quad \mathbf{R/ (m + 4n)(m - n)}$$

$$\bullet a^2 - b^3 + 2b^3x^2 - 2a^2x^2$$

$$a^2 - 2a^2x^2 - b^3 + 2b^3x^2$$

$$a^2(1 - 2x^2) - b^3(1 - 2x^2)$$

$$(a^2 - b^3)(1 - 2x^2) \quad \mathbf{R/ (a^2 - b^3)(1 - 2x^2)}$$

$$\bullet 2am - 3b - c - cm - 3bm + 2a$$

$$m(2a - c - 3b) + 1(2a - 3b - c) \quad \mathbf{R/ (m + 1)(2a - 3b - c)}$$

$$\bullet x^2 - 2/3x + 1/9$$

$$(x - 1/3)(x + 1/3) \quad \mathbf{R/ (x - 1/3)^2}$$

$$\bullet 4a^{2n} - b^{4n}$$

$$(2^{2n} + b^{2n})(2^{2n} - b^{2n}) \quad \mathbf{R/ (2^{2n} + b^{2n})(2^{2n} - b^{2n})}$$

$$\bullet 81x^2 - (a + x)^2$$

$$()() \quad \mathbf{R/ (10x + a)(8x - a)}$$

- $a^2 + 9 - 6a - 16x^2$  **R/**  $(a - 3 + 4x)(a - 3 - 4x)$
- $9a^2 - x^2 - 4 + 4x$  **R/**  $(3a + x - 2)(3a - x + 2)$
- $9x^2 - y^2 + 3x - y$  **R/**  $(3x - y)(3x + y + 1)$
- $x^2 - x - 72$  **R/**  $(x - 9)(x + 8)$
- $36a^4 - 120a^2b^2 + 49b^4$  **R/**  $(6a^2 + 6ab - 7b^2)(6a^2 - 6ab - 7b^2)$
- $a^2 - m^2 - 9n^2 - 6mn + 4ab + 4b^2$  **R/**  $(a + 2b + m + 3n)(a + 2b - m - 3n)$
- $1 - 4/9a^8$  **R/**  $(1 + 2/3a^4)(1 - 2/3a^4)$
- $81a^8 + 64b^{12}$  **R/**  $(9a^4 + 12a^2b^3 + 8b^6)(9a^4 - 12a^2b^3 + 8b^6)$
- $49x^2 - 77x + 30$

$$(7x)^2 - 11(7x) + 30 \text{ R/ } (7x - 5)(7x - 6)$$

- $x^2 - 2abx - 35a^2b^2$  **R/**  $(x - 7ab)(x + 5ab)$
- $125x^3 - 225x^2 + 135x - 27$

$$(125x^3 - 27) - (225x^2 - 135x)$$

$$(5x - 3)(25x^2 + 15x + 9) - 45x(5x - 3)$$

$$(5x - 3)(25x^2 + 15x + 9 - 45x) \text{ factor comun } (5x - 3)$$

$$(5x - 3)(25x^2 - 30x - 9)$$

$$(5x - 3)(5x - 3)^2 \text{ R/ } (5x - 3)^3$$

- $(a - 2)^2 - (a + 3)^2$

$$[(a - 2) - (a + 3)][(a - 2) + (a + 3)]$$

$$(a - 2 - a - 3)(a - 2 + a + 3)$$

$$(-5)(a - 2 + a + 3) \text{ R/ } -5(2a + 1)$$

- $4a^2m + 12a^2n - 5bm - 15bn$

$$4a^2(m + 3n) - 5b(m + 3n)$$

$$(m + 3n)^2(4a^2 - 5b) \text{ R/ } (4a^2 - 5b)(m + 3n)$$

- $1 + 6x^3 + 9x^6$

$$9x^6 + 6x^3 + 1$$

$$(3x^3)^2 + 2(3x^3) + 1$$

$$(3x^3 + 1)(3x^3 + 1) \text{ R/ } (1 + 3x^3)^2$$

- $a^4 + 3a^2b - 40b^2$

$$(a^2)^2 + 3b(a^2) - 40b^2 \text{ R/ } (a^2 - 5b)(a^2 + 8b)$$

- $m^3 + 8a^3x^3$

$$(m + 2ax)(m - 2ax)^2 \mathbf{R/ (m+2ax)(m^2 - 2amx + 4a^2x^2)}$$

$$\bullet 1 - 9x^2 + 24xy - 16y^2$$

$$(-1) 9x^2 - 24xy + 16y^2 - 1$$

$$(3x^2) - 8y(3x) + 16y^2) - 1$$

$$(3x - 4y)(3x - 4y) - 1 \mathbf{R/ (1 + 3x - 4y)(1 - 3x + 4y)}$$

$$\bullet 1 + 11x + 24x^2$$

$$(24x)^2 + 11(24x) + 24$$

$$(24x + 8)(24x + 3)/8 \cdot 3 \mathbf{R/ (3x + 1)(8x + 1)}$$

$$\bullet 9x^2y^3 - 27x^3y^3 - 9x^5y^3$$

$$9x^2y^3(1 - 3x - x^3) \mathbf{R/ 9x^2y^3(1 - 3x - x^3)}$$

$$\bullet (a^2 + b^2 - c^2)^2 - 9x^2y^2$$

$$[(a^2 + b^2 + c^2) - 3xy][(a^2 + b^2 - c^2 + 3xy) \mathbf{R/ (a^2 + b^2 - c^2 + 3xy) (a^2 + b^2 - c^2 - 3xy)}$$

$$\bullet 8(a + 1)^3 - 1$$

$$(2a + 2)^3 - 1$$

$$(2a + 1)(2^a + 2)^2 + (2^a + 2)(1) + (1)^2$$

$$(2a + 1)(4a^2 + 4 + 2^a + 2 + 1)$$

$$(2a + 1)4a^2 + 2(2a)(2) + 2^2$$

$$(2a + 1)4a^2 + 8^a + 4 + 2a + 2 + 1 \mathbf{R/ (2a + 1)(4a^2 + 10a + 7)}$$

$$\bullet 100x^4y^6 - 121m^4$$

$$(10x^2y^3)^2 - 11m^2 \mathbf{R/ (10x^2y^3 + 11m^2)(10x^2y^3 - 11m^2)}$$

$$\bullet (a^2 + 1)^2 + 5(a^2 + 1) - 24$$

$$(a^2 + 1 + 8)(a^2 + 1 - 3) \mathbf{R/ (a^2 + 9)(a^2 - 2)}$$

$$\bullet 1 + 1000x^6$$

$$(1 + 10x^2)(1 - 10x^2 + 100x^4) \mathbf{R/ (1 + 10x^2)(1 - 10x^2 + 100x^4)}$$

$$\bullet 49a^2 - x^2 - 9y^2 + 6xy$$

$$49a^2 (-x^2 - 9y^2 + 6xy)$$

$$49a^2 - (x^2 - 6xy + 9y^2)$$

$$49a^2 - [(x - 3y)(x - 3y)]$$

$$(49a^2) - (x - 3y)^2$$

$$(7a)^2 - (x - 3y)^2 \mathbf{R/ (7a + x - 3y)(7a - x + 3y)}$$

- $x^4 - y^2 + 4x^2 + 4 - 4yz - 4z^2$

$$x^4 + 4x^2 + 4 - y^2 - 4yz - 4z^2$$

$$(x^4 + 4x^2 + 4) - (y^2 + 4yz + 4z^2)$$

$$[(x^2 + 2)(x^2 + 2)][(y + 2z)(y + 2z)]$$

$$(x^2 + 2)^2 - (y + 2z)^2 \mathbf{R/ (x^2 + 2 + y + 2z)(x^2 + 2 - y - 2z)}$$

- $a^3 - 64 \mathbf{R/ (a - 4)(a^2 + 4a + 16)}$
- $a^5 + x^5 \mathbf{R/ (a + x)(a^4 - a^3x + a^2x^2 - ax^3 + x^4)}$
- $a^6 - 3a^3b - 54b^2 \mathbf{R/ (a^3 + 6b)(a^3 - 9b)}$
- $165 + 4x - x^2$

$$-(x^2 - 4x - 165)$$

$$-[(x - 15)(x + 11)] \mathbf{R/ (11 + x)(15 - x)}$$

- $a^4 + a^2 + 1$

$$(a^2 + a)^2 + 1$$

$$(a^2 + a + 1)(a^2 - a + 1) \mathbf{R/ (a^2 + a + 1)(a^2 - a + 1)}$$

- $x^2/4 - y^6/81$

$$(x/2 - y^3/9)(x/2 + y^3/9) \mathbf{R/ (x/2 + y^3/9)(x/2 - y^3/9)}$$

- $16x^2 + 8xy/5 + y^2/25$

$$4x^2 + (4x)(2y/5) + y^2/25$$

$$(4x + y/5)(4x + y/5) \mathbf{R/ (4x + y/5)^2}$$

- $a^4b^4 + 4a^2b^2 - 96$

$$(a^2b^2 + 12)(a^2b^2 - 8) \mathbf{R/ (a^2b^2 + 12)(a^2b^2 - 8)}$$

- $8a^2x + 7y + 21by - 7ay - 8a^3x + 24a^2bx$

$$8a^2x - 24a^2bx - 7ay$$

$$8a^2x(1 + 3b - a) + 7y(3b - a + 1) \mathbf{R/ (8a^2x + 7y)(1 - a + 3b)}$$

- $x^4 + 11x^2 - 390$

$$(x^2 + 26)(x^2 - 15) \mathbf{R/ (x^2 + 26)(x^2 - 15)}$$

- $7 + 33m - 10m^2$

$$-10m^2 + 33m + 7 \mathbf{R/ (1 + 5m)(7 - 2m)}$$

- $4(a + b)^2 - 9(c + d)^2$

$$(2(a + b))^2 - (3(c + d))^2$$

$$(2a + 2b)^2 - (3c + 3d)^2$$

$$[(2a + 2b) + (3c + 3d)][(2a + 2b) - (3c + 3d)] \mathbf{R/ (2a + 2b + 3c + 3d)(2a + 2b - 3c - 3d)}$$

- $729 - 125x^3y^{12}$

$$(9 - 5xy^4)(81 + 45xy^4 + 25x^2y^8) \mathbf{R/ (9 - 5xy^4)(81 + 45xy^4 + 25x^2y^8)}$$

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

$$x^2 + 2xy + y^2 + x + y$$

$$x^2 + x + 2xy + y + y^2$$

$$x y$$

$$(x + y)(x + y + 1) \mathbf{R/ (x + y)(x + y + 1)}$$

- $4 - (a^2 + b^2) + 2ab$

$$a^2 - b^2 + 2ab + 4$$

$$(a^2 + 2ab - b^2) + 4$$

$$(a + 1b)(a + 1b) + 4$$

$$(2 + a - b)(2 - a + b) \mathbf{R/ (2 + a - b)(2 - a + b)}$$

- $x^3 - y^3 + x - y$

$$x^3 + x - y + y^3$$

$$x(x^2 + 1) - y(y^2 + 1)$$

$$(x - y)(x^2 + xy + y^2 + 1) \mathbf{R/ (x - y)(x^2 + xy + y^2 + 1)}$$

- $a^2 - b^2 + a^3 - b^3$

$$a^3 + a^2 - b^2 - b^3$$

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

$$(a - b)(a^2 + ab + b^2 + a + b) \mathbf{R} / (a - b)(a^2 + ab + b^2 + a + b)$$