인수분해 공식

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실수 a, b, c, d, x에 대해 다음 식들이 성립한다.

(1) $(a+b)^2 = a^2 + 2ab + b^2$

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

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

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

(5) $(x+\frac{1}{x})^2 = x^2 + \frac{1}{x^2} + 2$

(6) $(x-\frac{1}{x})^2 = x^2 + \frac{1}{x^2} - 2$

(7) $x^2 + \frac{1}{x^2} = (x+\frac{1}{x})^2 - 2 = (x-\frac{1}{x})^2 + 2$

(8) $(x+\frac{1}{x})^2 = (x-\frac{1}{x})^2 + 4$

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

(10) $(x+\frac{1}{x})(x-\frac{1}{x}) = x^2 - \frac{1}{x^2}$

(11) $(x+a)(x+b) = x^2 + (a+b)x + ab$

(12) $(ax+b)(cx+d) = acx^2 + (ad+bc)x + bd$

(13) $(x+a)(x+b)(x+c) = x^3 + (a+b+c)x^2 + (ab+bc+ca)x + abc$

(14) $(x-a)(x-b)(x-c) = x^3 - (a+b+c)x^2 + (ab+bc+ca)x - abc$

(15) $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$

(16) $a^2 + b^2 + c^2 = (a+b+c)^2 - 2(ab+bc+ca)$

(17) $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 = a^3 + b^3 + 3ab(a+b)$

(18) $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3 = a^3 - b^3 - 3ab(a-b)$

(19) $a^3 + b^3 = (a+b)^3 - 3ab(a+b)$

(20) $a^3 - b^3 = (a-b)^3 + 3ab(a-b)$

(21) $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

(22) $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

(23) $(a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca) = a^3 + b^3 + c^3 - 3abc$

    $* \ a+b+c = 0$ 이면 $a^3 + b^3 + c^3 = 3abc$

    $* \ a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2}[(a-b)^2 + (b-c)^2 + (c-a)^2]$

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

(25) $(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$.

(26) $(a-b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$.

    실수 a, b, x, 자연수 n, k에 대해

(27) $a^n - b^n = (a-b)(a^{n-1} + a^{n-2}b + a^{n-3}b^2 + \cdots + a^2b^{n-3} + ab^{n-2} + b^{n-1})$

(28) $x^n - 1 = (x-1)(x^{n-1} + x^{n-2} + x^{n-3} + \cdots + x^2 + x + 1)$

(29) $a^{2k+1} + b^{2k+1} = (a+b)(a^{2k} - a^{2k-1}b + a^{2k-2}b^2 - \cdots - ab^{2k-1} + b^{2k})$

(30) $x^{2k+1} + 1 = (x+1)(x^{2k} - x^{2k-1} + x^{2k-2} - \cdots - x + 1)$