Calcul algebric

Avem formulele:

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

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

$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ac$ ←

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

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

$(-a-b-c)^2 = [(-1)\cdot(a+b+c)]^2 = +(a+b+c)$

ATENȚIE: $(a\pm b)^2 \neq a^2 \pm b^2$

Ex: $4 = 2^2 = (5-3)^2 \neq 5^2-3^2 = 25-9 = 16$

$5^3 = 5\cdot 5\cdot 5$

$5^3 = 5\cdot 5^2$

$(a\cdot b)^n = a^n\cdot b^n$ $\quad (a:b)^n = \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b\neq 0$

$(a+b)^3 = (a+b)\cdot(a+b)^2 = (a+b)\cdot(a^2+2ab+b^2) =$

$= a^3 + 2a^2b + ab^2 + a^2b + 2ab^2 + b^3 \Rightarrow$

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

$a\cdot 2\cdot a\cdot b = 2\cdot a\cdot a\cdot b = 2a^2b$

$(a-b)^3 = (a-b)\cdot(a-b)(a-b) = (a-b)\cdot(a-b)^2 =$

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

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

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

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

$\frac{2}{3}\cdot x^2\cdot\left(-\frac{9}{2}\cdot xy\right) = -\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}}\cdot\frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{2}}}\cdot x^3\cdot y = -3\cdot x^3\cdot y$

$+\sqrt{2}\cdot x\cdot\left(-\sqrt{6}\,x^2y\right) = -2\sqrt{3}\,x^3y$

$(-2x^4y^3z):(-8x^1y^2z)=$

$=+\frac{2}{8}\cdot x^3y\cdot 1=\frac{1}{4}\cdot x^3y$

$\begin{cases} x\neq 0 \\ y\neq 0 \\ z\neq 0 \end{cases}$

$(-27\cdot x^9y^8z^3):(9x^4y^7z^3)=-3x^5y^1\cdot 1=-3x^5y$

$(18x^2y^7z^2):(-36x^2y^6z)=-\frac{\cancel{18}^{1}}{\cancel{36}_{2}}\cdot 1\cdot y\cdot z=-\frac{1}{2}\cdot y\cdot z$

$(-\sqrt{2}x^2yz^3)^3=(-\sqrt{2})^3\cdot(x^2)^3\cdot y^3\cdot(z^3)^3=$

$=-2\sqrt{2}\cdot x^6\cdot y^3z^9$

$\left[(-\sqrt{2})^3=-\sqrt{2^3}=-\sqrt{2^2\cdot 2}=-\sqrt{2^2}\cdot\sqrt{2}=-2\sqrt{2}\right]$

$(\sqrt{5})^4=\sqrt{5^4}=\sqrt{(5^2)^2}=5^2=25$

$\left(-\frac{3}{\sqrt{5}}\cdot x^2y^3z\right)^4=\frac{81}{25}\cdot x^8y^{12}z^4$

$\sqrt{a^2}=a,\ a\geq 0$

$(\sqrt{2})^{10}=\sqrt{2^{10}}=\sqrt{(2^5)^2}=2^5=32$

$(\sqrt{2})^{11}=\sqrt{2^{11}}=\sqrt{2^{10}\cdot 2^1}=\sqrt{2^{10}}\cdot\sqrt{2}=32\sqrt{2}$

$12x^3y^2z:(-3x^2y^2z)=-4x$

$\begin{cases} 2:(-3)=2:\frac{-3}{1}=2\cdot\frac{1}{-3} \end{cases}$

$18x^5y^4z:(-3)\cdot x^2y^2=\cancel{18}^{6}x^5y^4z\cdot\frac{1}{\cancel{-3}_{-1}}\cdot x^2y^2=-6x^7y^6z$

$15x^4yz:(-15x^4y)=-1\cdot 1\cdot 1\cdot z=-z$

$18 \cdot 5 : (-3 \cdot 5) = \frac{18 \cdot 5}{-3 \cdot 5} = -6$

$18 \cdot 5 : (-3) \cdot 5 = 18 \cdot 5 \cdot \left(-\frac{1}{3}\right) \cdot 5 = -6 \cdot 5 \cdot 5 = -150$

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

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

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

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

$3 \cdot (x+1) - (x-2)(x+2) + (x-3)(x+5) =$

$= 3x + 3 - (x^2 - 2^2) + x^2 + 5x - 3x - 15 =$

$= x^2 + 5x - 12 - x^2 + 4 = 5x - 8$

$(-x+2) \cdot (x+3) - (x-3) \cdot (x+3) - (x-2)^2 =$

$= -x^2 - 3x + 2x + 6 - (x^2 - 3^2) - (x^2 - 2 \cdot 2 \cdot x + 2^2) =$

$= -x^2 - x + 6 - x^2 + 9 - x^2 + 4x - 4 =$

$= -3x^2 + 3x + 11$

$\frac{2}{1} - \frac{1}{4} = \frac{8}{4} - \frac{1}{4} = \frac{7}{4}$

$(6x^4 - 30x^2 + 12x) : (-6x) - \left(2x - \frac{1}{2}\right)^2 =$

$= \frac{6x^4 - 30x^2 + 12x}{-6x} - \left[(2x)^2 - 2 \cdot 2x \cdot \frac{1}{2} + \left(\frac{1}{2}\right)^2\right] =$

$= \frac{6x \cdot (x^3 - 5x^2 + 2)}{-6x} - \left(4x^2 - 2x + \frac{1}{4}\right) =$

$= x^3 - 5x^2 + 2 - 4x^2 + 2x - \frac{1}{4} = x^3 - 9x^2 + 2x + \frac{7}{4}$