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МФТИ физ-тех

$$(x + y + z)^3 - x^3 - y^3 - z^3 =$$
$$(x+y+z-x)\ ((x+y+z)^2+(x+y+z)*x+x^2)$$
$$-y^3-z^3 =$$
$$(y+z)(2xy+2yz+2zx+x^2+z^2+y^2$$
$$+x*x+y*x+z*x+x^2)-y^3-z^3=$$
$$(y+z)(2xy+2yz+2zx+x^2+z^2+y^2$$
$$+x^2+yx+zx+x^2)-(y^3+z^3)=$$
$$(y+z)*(3xy+2yz+3zx+z^2+y^2 +3x^2)-$$
$$-(y+z)*(y^2-yz+z^2)=$$
$$(y+z)\{(3xy+2yz+3zx+z^2+y^2$$
$$+3x^2)-(y^2-yz+z^2)\}=$$
$$(y+z)\{3xy+2yz+3zx+z^2+y^2$$
$$+3x^2-y^2+yz-z^2\} =$$
$$(y+z)\{3xy+3yz+3zx+3x^2\}=$$
$$(y+z)3(xy+yz+zx+x^2)=$$
$$3(y+z)\{x(y+x)+z(y+x)\}= 3(y+z)(x+y)(x+z)$$

$x^3+y^3=(x+y)(x^2-xy+y^2)$
$x^3-y^3=(x-y)(x^2+xy+y^2)$
$(x+y)^3=x^3+3x^2y+3xy^2+y^3$
$(x-y)^3=x^3-3x^2y+3xy^2-y^3$
$(x+y)^2=x^2+2xy+y^2$

$$(x+y+z)^2=$$
$$=(x+y+z)\ (x+y+z)=$$
$$=(x+y+z)*x+(x+y+z)*y$$
$$+(x+y+z)*z=x*x+x*y+x$$
$$*z+y*x+y*y+y*z+z*x+z$$
$$*z+z*y=x^2+xy+xz+yx+$$
$$y^2+yz+zx+z^2+zy=xy($$
$$1+1)+yz(1+1)+zx(1+1)$$
$$+x^2+y^2+z^2=$$
$$2xy+2yz+2zx+x^2+z^2+$$
$$y^2$$