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BINOMISCHE FORMELN – LÖSUNG

① $(a+b)^2 = a^2 + 2ab + b^2$

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

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

② a) $(3+b)^2 = 9 + 6b + b^2$

b) $(3-b)^2 = 3^2 - 2\cdot 3\cdot b + b^2 = 9 - 6b + b^2$

c) $(-3+b)^2 = 9 - 6b + b^2$

d) $(2x+5)^2 = 4x^2 + 20x + 25$

e) $(2x^2+3x^4)^2 = 4x^4 + 12x^6 + 9x^8$

$x^2 \cdot x^4 = x^{2+4} = x^6$

$\underbrace{x\cdot x}_{2\text{-mal}} \cdot \underbrace{x\cdot x\cdot x\cdot x}_{4\text{-mal}}$

$(x^4)^2 = x^{4\cdot 2} = x^8$

f) $(a-3)(a+3) = a^2 - 9$

g) $(b^2+4)(b^2-4) = (b^2)^2 - 4^2 = b^4 - 16$

h) $(2x+3)(2x-3) = 4x^2 - 9$

i) $(2x+3)(2x+3) = 4x^2 + 12x + 9$

j) $(-3-b)^2 = (-3)^2 + 2\cdot(-3)\cdot(-b) + (-b)^2 = 9 + 6b + b^2$

③ a) $a^2 + 4ab + 4b^2 = (a+2b)^2$

b) $4a^2 - 12ab + 9b^2 = (2a-3b)^2$

c) $25x^2 + 40xy + 16y^2 = (5x+4y)^2$

d) $x^4 + 2x^2y^2 + y^4 = (x^2+y^2)^2$

$a^2 + 2ab + b^2 \qquad (a+b)^2$

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

f) $25x^2 - 16y = (5x + 4\sqrt{y})(5x - 4\sqrt{y})$

g) $25x^2 + 16y = 25x^2 - 16y\cdot i^2 = (5x + 4\sqrt{y}i)(5x - 4\sqrt{y}i)$

$\sqrt{9} = 3$

$\sqrt{-9} = ↯$

$\boxed{\begin{aligned} i &= \sqrt{-1} \\ i^2 &= -1 \end{aligned}}$ Komplexe Zahlen

④ a)

n	
0	1
1	1 1
2	1 2 1
3	1 3 3 1
4	1 4 6 4 1
5	1 5 10 10 5 1
6	1 6 15 20 15 6 1
7	1 7 21 35 35 21 7 1

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

b) $(x+y)^4 = 1\cdot x^4 \cdot y^0 + 4\cdot x^3\cdot y^1 + 6\cdot x^2\cdot y^2 + 4\cdot x^1\cdot y^3 + 1\cdot x^0\cdot y^4$

$= x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$

c) $(3-3x)^3 = 1\cdot 3^3\cdot(-3)^0 + 3\cdot 3^2\cdot(-3)^1 + 3\cdot 3^1\cdot(-3)^2 + 1\cdot 3^0\cdot(-3)^3$

$= 27 - 81x + 81x^2 - 27x^3$

d) $(5+x)^5 = 1\cdot 5^5\cdot x^0 + 5\cdot 5^4\cdot x^1 + 10\cdot 5^3\cdot x^2 + 10\cdot 5^2\cdot x^3 + 5\cdot 5^1\cdot x^4 + 1\cdot 5^0\cdot x^5$

$= 3125 + 3125x + 1250x^2 + 250x^3 + 25x^4 + x^5$

e) $(-2-4x)^3 = 1\cdot(-2)^3(-4x)^0 + 3\cdot(-2)^2(-4x)^1 + 3\cdot(-2)^1(-4x)^2 + 1\cdot(-2)^0(-4x)^3 +$

$= -8 - 48x - 96x^2 - 64x^3$