

Lösungen zum Aufgabenblatt für den 06.07.2005

1. a)  $(5x + 3y)^2 = 25x^2 + 30xy + 9y^2$       b)  $(7x^2 + 3)^2 = 49x^4 + 42x^2 + 9$   
 c)  $(9x - 5y)^2 = 81x^2 - 90xy + 25y^2$       d)  $(5k^2 - 12m^2)^2 = 25k^4 - 120k^2m^2 + 144m^4$   
 e)  $(4p^2 + 9q^2)^2 = 16p^4 + 72p^2q^2 + 81q^4$       f)  $(1,2x^2 - 0,18y^3)^2 = 1,44x^4 - 0,432x^2y^3 + 0,0324y^6$   
 g)  $(1 - 4y)(1 + 4y) = 1 - 16y^2$       h)  $(5,5x^2 + 0,75y^2)(5,5x^2 - 0,75y^2)$   
        $= 30,25x^4 - 0,5625y^4$   
 i)  $(2 - z)^2 - (2 - z)(2 + z) + (2 + z)^2 = 4 - 4z + z^2 - (4 - z^2) + 4 + 4z + z^2 = 4 + 3z^2$   
 j)  $(4a + 3b^2)^2 + 3(4a + 5b^2)(4a - 5b^2) - 4(3a - 4b^2)^2$   
        $= 16a^2 + 24ab^2 + 9b^4 + 3(16a^2 - 25b^4) - 4(9a^2 - 24ab^2 + 16b^4)$   
        $= 16a^2 + 24ab^2 + 9b^4 + 48a^2 - 75b^4 - 36a^2 + 96ab^2 - 64b^4 = 28a^2 + 120ab^2 - 130b^4$   
 k)  $(x + y)^2 + (x - y)^2$       l)  $(x + y)^2 - (x - y)^2$   
        $= x^2 + 2xy + y^2 + x^2 - 2xy + y^2 = 2x^2 + 2y^2$        $= x^2 + 2xy + y^2 - (x^2 - 2xy + y^2) = 4xy$   
 m)  $(5a + 7b)^2 - (5a - 7b)^2 + (5a - 7b)(5a + 7b)$   
        $= 25a^2 + 70ab + 49b^2 - (25a^2 - 70ab + 49b^2) + 25a^2 - 49b^2 = 25a^2 + 140ab - 49b^2$   
 n)  $(x + y + z)(x + y - z) = [(x + y) + z][(x + y) - z] = (x + y)^2 - z^2 = x^2 + 2xy + y^2 - z^2$   
 o)  $(4a - 7b - 3c)(4a - 7b + 3c) = [(4a - 7b) - 3c][(4a - 7b) + 3c] = (4a - 7b)^2 - 9c^2 = 16a^2 - 56ab + 49b^2 - 9c^2$   
 p)  $(x + y - z)^2 = [(x + y) - z]^2 = (x + y)^2 - 2(x + y)z + z^2 = x^2 + 2xy + y^2 - 2xz - 2yz + z^2$   
 q)  $(1,3a - 1,8b + 1,7c)^2 = [(1,3a - 1,8b) + 1,7c]^2 = (1,3a - 1,8b)^2 + 2 \cdot (1,3a - 1,8b) \cdot 1,7c + 2,89c^2$   
        $= 1,69a^2 - 4,68ab + 3,24b^2 + 4,42ac - 6,12bc + 2,89c^2$   
 r)  $[(1 - x)^2 + (1 + x)^2](1 + x)(1 - x) - [(x - 1)^2 + (x + 1)^2](x + 1)(x - 1)$   
        $= [1 - 2x + x^2 + 1 + 2x + x^2](1 - x^2) - [x^2 - 2x + 1 + x^2 + 2x + 1](x^2 - 1)$   
        $= (2 + 2x^2)(1 - x^2) - (2x^2 + 2)(x^2 - 1) = 2 \cdot (1 + x^2)(1 - x^2) - 2 \cdot (x^2 + 1)(x^2 - 1) = 2 \cdot (1 - x^4) - 2 \cdot (x^4 - 1)$   
        $= 2 - 2x^4 - 2x^4 + 2 = 4 - 4x^4$
2. a)  $25x^2 - 70xy + 49y^2 = (5x - 7y)^2$       b)  $4a^2 - 2ab + 0,25b^2 = (2a - 0,5b)^2$   
 c)  $(4x)^2 - 8xy + y^2 = (4x - y)^2$       d)  $196a^2 - 49y^2 = (14a - 7y)(14a + 7y)$   
 e)  $289x^4y^2 - 361x^4y^2 = -72x^4y^2$   
 f)  $289x^4y^2 - 361x^2y^4 = x^2y^2 \cdot (289x^2 - 361y^2) = x^2y^2 \cdot (17x - 19y)(17x + 19y)$   
 g)  $289x^4y^2 + 361x^4y^2 = 650x^4y^2$       h)  $4x^2 + 0,8xy + 0,04y^2 = (2x + 0,2y)^2$   
 i)  $xy + 2x + 3y + 6 = x \cdot (y + 2) + 3 \cdot (y + 2) = (y + 2)(x + 3)$       j)  $xy + 20 + 4x + 5y = xy + 4x + 5y + 20$   
        $= x \cdot (y + 4) + 5 \cdot (y + 4) = (y + 4)(x + 5)$   
 k)  $x^3 + x^2 + x + 1 = x^2 \cdot (x + 1) + 1 \cdot (x + 1) = (x + 1)(x^2 + 1)$       l)  $cy - dy + 5xy = y \cdot (c - d + 5x)$   
 m)  $x^2 + 2x - 8 = (x + 4)(x - 2)$       n)  $x^2 - 3x - 4 = (x - 4)(x + 1)$   
 o)  $x^2 - 14x + 40 = (x - 10)(x - 4)$       p)  $18 - 11x + x^2 = (2 - x)(9 - x)$   
 q)  $y^2 - 23x + 42x^2 = (y - 21x)(x - 2y)$       r)  $25x^2 - 16 = (5x - 4)(5x + 4)$   
 s)  $x^2 - 11$  nicht möglich      t)  $9x^2 - 144 = (3x - 12)(3x + 12)$   
 u)  $4x^2 + 9$  nicht möglich      v)  $x^4 - y^4 = (x^2 - y^2)(x^2 + y^2) = (x - y)(x + y)(x^2 + y^2)$   
 w)  $x^8 - y^6 = (x^4 - y^3)(x^4 + y^3)$       x)  $24x^2y + 8x^2y + 18xy^2 = 32x^2y + 18xy^2$   
        $= 2xy \cdot (16x + 9y)$   
 y)  $0,27x^2y - 507y^3 = 3y \cdot (0,09x^2 - 169y^2) = 3y \cdot (0,3x - 13y)(0,3x + 13y)$   
 z)  $2x^3y + 128xy^3 - 32x^2y^2 = 2xy \cdot (x^2 + 64y^2 - 16xy) = 2xy \cdot (x^2 - 16xy + 64y^2) = 2xy \cdot (x - 8y)^2$