

Übungen

Def. 1 p. 73

$$\begin{aligned}c) (x-2y)^4 &= C_4^0 x^4 (2y)^0 + C_4^1 x^3 (2y)^1 + C_4^2 x^2 (2y)^2 + C_4^3 x^1 (2y)^3 + C_4^4 x^0 (2y)^4 \\&= x^4 + 4 \cdot x^3 \cdot (-2y) + 6 x^2 \cdot 4y^2 + 4 x \cdot (-8y^3) + 16y^4 \\&= x^4 - 8x^3y + 24x^2y^2 - 32xy^3 + 16y^4\end{aligned}$$

$$\begin{aligned}h) (-a+2b)^5 &= C_5^0 (-a)^5 (2b)^0 + C_5^1 (-a)^4 (2b)^1 + C_5^2 (-a)^3 (2b)^2 + C_5^3 (-a)^2 (2b)^3 + C_5^4 (-a)^1 (2b)^4 \\&\quad + C_5^5 (-a)^0 (2b)^5 \\&= -a^5 + 5 \cdot a^4 \cdot 2b + 10 \cdot (-a^3) \cdot 4b^2 + 10 a^2 \cdot 8b^3 + 5(-a) \cdot 16b^4 \\&\quad + 32b^5 \\&= -a^5 + 10a^4b - 40a^3b^2 + 80a^2b^3 - 80ab^4 + 32b^5\end{aligned}$$

oef. 2 p. 73

a) de 6^e term van $(1 - \frac{1}{b})^9$

$$\begin{aligned} T_6 &= C_9^{6-1} \cdot 1^{9-6+1} \cdot \left(\frac{-1}{b}\right)^{6-1} \\ &= C_9^5 \cdot 1^4 \cdot \left(\frac{-1}{b}\right)^5 \\ &= -C_9^5 \cdot \frac{1}{b^5} \\ &= \frac{-126}{b^5} \end{aligned}$$

oef. 4 p. 73

a) in x^4 in ontw. v. $(-2x-1)^8$

$$(-2x-1)^8 = \sum_{k=0}^8 C_8^k \cdot (-2x)^{8-k} \cdot (-1)^k$$

↳ exponent van x in algemene term in ontw. is $8-k$

$$\text{dus } 8-k = 4$$

$$k = 4$$

$$\text{De term in } x^4 \text{ is } C_8^4 \cdot (-2x)^4 \cdot (-1)^4 = 70 \cdot 2^4 x^4 = 1120 x^4$$

e) in \sqrt{x} ($= x^{1/2}$) in ontw. v. $(x^2 + \frac{1}{2\sqrt{x}})^9$

$$\begin{aligned} \left(x^2 + \frac{1}{2\sqrt{x}}\right)^9 &= \sum_{k=0}^9 C_9^k \cdot (x^2)^{9-k} \cdot \left(\frac{1}{2\sqrt{x}}\right)^k \\ &= \sum_{k=0}^9 C_9^k x^{18-2k-\frac{k}{2}} \cdot \frac{1}{2^k} \end{aligned}$$

$$\begin{aligned} \left(\frac{1}{2\sqrt{x}}\right)^k &= (\sqrt{x})^{-k} \\ &= (x^{1/2})^{-k} \\ &= x^{-k/2} \end{aligned}$$

$$\text{Dus } 18 - 2k - \frac{k}{2} = \frac{1}{2}$$

$$\Leftrightarrow 36 - 4k - k = 1$$

$$\Leftrightarrow 5k = 35$$

$$\Leftrightarrow k = 7$$

De term in \sqrt{x} is:

$$C_9^7 x^{18-2 \cdot 7 - \frac{7}{2}} \cdot \frac{1}{2^7} = C_9^7 x^{1/2} \cdot \frac{1}{128} = \frac{36}{128} \sqrt{x} = \frac{9\sqrt{x}}{32}$$