Lösungen zum Aufgabenblatt für den 03.-.04.05.2005

1. a) $\left(-\frac{2}{3}x+\frac{1}{3}z\right)\left(-\frac{x}{7}+\frac{y}{3}-\frac{z}{4}\right)=\left(-\frac{2}{3}x+\frac{1}{3}z\right)\left(-\frac{1}{7}x+\frac{1}{3}y-\frac{1}{4}z\right)$

$=\frac{2}{21}x^2-\frac{2}{9}xy+\frac{1}{6}xz-\frac{1}{21}xz+\frac{1}{9}yz-\frac{1}{12}z^2=\frac{2}{21}x^2-\frac{2}{9}xy+\frac{7}{42}xz-\frac{2}{42}xz+\frac{1}{9}yz-\frac{1}{12}z^2$

$=\frac{2}{21}x^2-\frac{2}{9}xy+\frac{5}{42}xz+\frac{1}{9}yz-\frac{1}{12}z^2$

b) $\left(x-\frac{1}{4}\right)\cdot(4x+1)\cdot\left(2x-\frac{1}{2}\right)=\left[\left(x-\frac{1}{4}\right)\cdot(4x+1)\right]\cdot\left(2x-\frac{1}{2}\right)$ Assoziativgesetz

$=\left[4x^2+x-x-\frac{1}{4}\right]\cdot\left(2x-\frac{1}{2}\right)=\left[4x^2-\frac{1}{4}\right]\cdot\left(2x-\frac{1}{2}\right)=8x^3-2x^2-2x+\frac{1}{8}$

c) $\left(1\frac{2}{3}s^2-1\frac{1}{3}rs\right)\left(\frac{1}{2}s+\frac{3}{4}r\right)-\left(\frac{2}{3}s-\frac{1}{3}r\right)\left(\frac{3}{4}s-\frac{1}{2}r\right)(s-r)$

$=\frac{5}{3}s^2\cdot\frac{1}{2}s+\frac{5}{3}s^2\cdot\frac{3}{4}r-\frac{4}{3}rs\cdot\frac{1}{2}s-\frac{4}{3}rs\cdot\frac{3}{4}r-\left[\frac{1}{2}s^2-\frac{1}{3}rs-\frac{1}{4}rs+\frac{1}{6}r^2\right](s-r)$

$=\frac{5}{6}s^3+\frac{5}{4}rs^2-\frac{2}{3}rs^2-r^2s-\left[\frac{1}{2}s^2-\frac{7}{12}rs+\frac{1}{6}r^2\right](s-r)$

$=\frac{5}{6}s^3+\frac{7}{12}rs^2-r^2s-\left\{\frac{1}{2}s^3-\frac{1}{2}rs^2-\frac{7}{12}rs^2+\frac{7}{12}r^2s+\frac{1}{6}r^2s-\frac{1}{6}r^3\right\}$

$=\frac{5}{6}s^3+\frac{7}{12}rs^2-r^2s-\left\{\frac{1}{2}s^3-\frac{13}{12}rs^2+\frac{3}{4}r^2s-\frac{1}{6}r^3\right\}$

$=\frac{5}{6}s^3+\frac{7}{12}rs^2-r^2s-\frac{1}{2}s^3+\frac{13}{12}rs^2-\frac{3}{4}r^2s+\frac{1}{6}r^3$

$=\frac{5}{6}s^3-\frac{1}{2}s^3+\frac{7}{12}rs^2+\frac{13}{12}rs^2-r^2s-\frac{3}{4}r^2s+\frac{1}{6}r^3=\frac{1}{3}s^3+1\frac{2}{3}rs^2-1\frac{3}{4}r^2s+\frac{1}{6}r^3$

d) $\left[\left(\frac{2}{3}x-\frac{2}{5}y\right)(2x-5y)-\left(\frac{4}{5}x-\frac{4}{5}y\right)\cdot\frac{3}{4}x+\frac{8}{15}xy-\frac{8}{15}x^2\right]\left(5x-\frac{1}{2}y\right)\left(5x+\frac{1}{2}y\right)$

$=\left[\left(\frac{2}{3}x-\frac{2}{5}y\right)(2x-5y)-\left(\frac{4}{5}x-\frac{4}{5}y\right)\cdot\frac{3}{4}x+\frac{8}{15}xy-\frac{8}{15}x^2\right]\left[\left(5x-\frac{1}{2}y\right)\left(5x+\frac{1}{2}y\right)\right]$ Assoziativges.

$=\left[\frac{4}{3}x^2-\frac{10}{3}xy-\frac{4}{5}xy+2y^2-\left(\frac{3}{5}x^2-\frac{3}{5}xy\right)+\frac{8}{15}xy-\frac{8}{15}x^2\right]\left[25x^2+\frac{5}{2}xy-\frac{5}{2}xy-\frac{1}{4}y^2\right]$

$=\left[\frac{4}{3}x^2-\frac{10}{3}xy-\frac{4}{5}xy+2y^2-\frac{3}{5}x^2+\frac{3}{5}xy+\frac{8}{15}xy-\frac{8}{15}x^2\right]\left[25x^2-\frac{1}{4}y^2\right]$

$=\left[\frac{20}{15}x^2-\frac{9}{15}x^2-\frac{8}{15}x^2-\frac{50}{15}xy-\frac{12}{15}xy+\frac{9}{15}xy+\frac{8}{15}xy+2y^2\right]\left[25x^2-\frac{1}{4}y^2\right]$

$=\left[\frac{1}{5}x^2-3xy+2y^2\right]\left[25x^2-\frac{1}{4}y^2\right]$

$=5x^4-\frac{1}{20}x^2y^2-75x^3y+\frac{3}{4}xy^3+50x^2y^2-\frac{1}{2}y^4$

$=5x^4-75x^3y+50x^2y^2-\frac{1}{20}x^2y^2+\frac{3}{4}xy^3-\frac{1}{2}y^4$

$=5x^4-75x^3y+49\frac{19}{20}x^2y^2+\frac{3}{4}xy^3-\frac{1}{2}y^4$

2. a) $\frac{1}{4}+a+a^2$ b) $v^4+2v^2u^2+u^4$ c) $100a^2+0{,}2ab+0{,}0001b^2$

d) $p^2q^2-2pqr+r^2$ e) a^4-2a^2+1 f) $a^2+2ab+b^2$

g) x^2-36 h) $(-a)^2-b^2=a^2-b^2$ i) $(n-m)(n+m)=n^2-m^2$

3. a) $(2+8a)^2=4+32a+64a^2$ b) $(4a-5x)^2=16a^2-40ax+25x^2$

c) $(1-ax)^2=1-2ax+a^2x^2$ d) $(7-3z)^2=49-42z+9z^2$

e) $(4-k)(4+k)=16-k^2$ f) $(6q-p)(6q+p)=36q^2-p^2$

4. a) $(2a+b)^2=4a^2+4ab+b^2$ b) $(x-3y)^2=x^2-6xy+9y^2$

c) $(7a+2b)^2=49a^2+28ab+4b^2$ d) $(3c-4d)^2=9c^2-24cd+16d^2$

e) $(8+b)^2=64+16b+b^2$ f) $(x^2+0{,}5)^2=x^4+x^2+0{,}25$