Q12 * Mathematik m3 * Berechnung einfacher bestimmter Integrale

$$\int_{-1}^{2} (3x-1)\,dx = \left[\frac{3x^2}{2} - x\right]_{-1}^{2} = \left(\frac{3\cdot 4}{2} - 2\right) - \left(\frac{3}{2} - (-1)\right) =$$
$$= 4 - 2{,}5 = 1{,}5$$

$$\int_{0}^{2} 2\sqrt{x} + 0{,}5x\,dx = \int_{0}^{2} 2\cdot x^{1/2} + 0{,}5x\,dx = \left[\frac{2\cdot x^{3/2}}{\frac{3}{2}} + \frac{0{,}5x^2}{2}\right]_{0}^{2} =$$
$$= \left[\frac{4}{3}x\sqrt{x} + \frac{1}{4}x^2\right]_{0}^{2} = \frac{8}{3}\sqrt{2} + \frac{1}{4}\cdot 4 - 0$$
$$= 1 + \frac{8}{3}\sqrt{2}$$

$$\int_{1}^{3} \frac{2}{\sqrt{x}}\,dx = \int_{1}^{3} 2\cdot x^{-1/2}\,dx = \left[2\cdot\frac{x^{1/2}}{1/2}\right]_{1}^{3} = \left[4\sqrt{x}\right]_{1}^{3}$$
$$= 4\sqrt{3} - 4 \quad \left(= 4\cdot(\sqrt{3}-1)\right)$$

$$\int_{0}^{1} (x+2)^2\,dx = \int_{0}^{1} x^2 + 4x + 4\,dx = \left[\frac{x^3}{3} + \frac{4x^2}{2} + 4x\right]_{0}^{1} =$$
$$= \frac{1}{3} + 2 + 4 - 0 = \frac{19}{3} \quad \text{oder}$$
$$= \left[\frac{(x+2)^3}{3}\right]_{0}^{1} = \frac{3^3}{3} - \frac{2^3}{3} = \frac{27-8}{3} = \frac{19}{3}$$

$$\int_{-1}^{1} (2x-1)^2\,dx = \left[\frac{(2x-1)^3}{3\cdot 2}\right]_{-1}^{1} = \frac{1}{6} - \frac{(-3)^3}{6} = \frac{28}{6} = \frac{14}{3}$$
$$\text{oder} = \int_{-1}^{1} 4x^2 - 4x + 1\,dx = \left[\frac{4x^3}{3} - \frac{4x^2}{2} + x\right]_{-1}^{1} =$$
$$= \frac{4}{3} - 2 + 1 - \left(-\frac{4}{3} - 2 - 1\right) = \frac{8}{3} + 2 = \frac{14}{3}$$

$$\int_{-1}^{1} (2-x)^4\,dx = \left[\frac{(2-x)^5}{-5}\right]_{-1}^{1} = \frac{1}{-5} - \left(\frac{3^5}{-5}\right) = \frac{243}{5} - \frac{1}{5} =$$
$$= \frac{242}{5}$$

$$\int_{-2}^{2} x^5 - 4x^3 + 2x\,dx = 0,$$ da $f(x)$ einen zum Ursprung punktsymmetr. Graphen besitzt.

$$\int_{0}^{2} 3\cdot\sqrt{2x+1}\,dx = \left[\frac{3\cdot(2x+1)^{3/2}}{2\cdot\frac{3}{2}}\right]_{0}^{2} = \left[(2x+1)^{3/2}\right]_{0}^{2} = 5\sqrt{5} - 1$$