Berechne die Flächen, die die jeweiligen Funktionen mit der x-Achse einschließen, mittels Integration:

$$\int_1^5 3x + 4\,dx = \frac{3}{2}x^2 + 4x\,|_1^5 = \left(\frac{3}{2}5^2 + 4 * 5\right) - \left(\frac{3}{2}1^2 + 4\right) = \frac{115}{2} - \frac{11}{2}$$
$$= 52$$

$$\int_0^{\pi} \sin x\,dx = -\cos x\,|_0^{\pi} = -\cos(\pi) + \cos(0) = 1 + 1 = 2$$

$$\int_{10}^{20} 3\,dx = 3x\,|_{10}^{20} = 3 * 20 - 3 * 10 = 60 - 30 = 30$$

$$\int_{90^0}^{180^o} \sin(x) - \cos(x)\,dx = (-\cos(x) - \sin(x))|_{90^0}^{180^o}$$
$$= (-\cos(180^o) - \sin(180^o)) - (-\cos(90^o) - \sin(90^o))$$
$$= (1 - 0) - (0 - 1) = 1 + 1 = 2$$

$$\int_{-1}^{1} 2x + 1\,dx = -\int_{-1}^{-1/2} 2x + 1\,dx + \int_{-1/2}^{1} 2x + 1\,dx$$

$$= -(x^2 + x)\Big|_{-1}^{-\frac{1}{2}} + (x^2 + x)\Big|_{-\frac{1}{2}}^{1}$$

$$= -\left(\left(-\frac{1}{2}\right)^2 - \frac{1}{2} - ((-1)^2 + (-1))\right) + \left(1^2 + 1 - \left(\left(-\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right)\right)\right)$$

$$= +\frac{1}{4} + \frac{9}{4} = \frac{10}{4}$$

Es darf nicht über eine Nullstelle hinweg integriert werden!

$$\int_1^2 \frac{1}{x}\, dx = ln|x|\,|_1^2 = ln|2| - ln|1| = ln|2| - 0 = ln|2|$$

$$\int_4^6 4e^x dx = 4e^x\,|_4^6 = 4(e^6 - e^4)$$

$$\int_0^2 3x^2 + 1\, dx = (x^3 + x)|_0^2 = (2^3 + 2) - (0 + 0) = 8 + 2 = 10$$