

Aufgabe 1

$$\text{a) } F(x) = \int \frac{x}{\sqrt{x^2-1}} dx = \underline{\underline{\sqrt{x^2-1}}}$$

$$\text{b) } F(x) = \int (2x+3) \cdot e^{x^2+3x+a} dx = \underline{\underline{e^{x^2+3x+a}}}$$

$$\text{c) } F(x) = \int \frac{8x}{6x^2+4x-2} dx = \int \frac{4x}{(x+1)(3x-1)} dx = \int \frac{1}{x+1} + \frac{1}{3x-1} dx = \underline{\underline{\ln|x+1| + \frac{\ln|3x-1|}{3}}}$$

Aufgabe 2

$$\begin{aligned} \int_0^\pi \sin^2 x \, dx &= \int_0^{\pi/2} \sin^2 x \, dx + \int_{\pi/2}^\pi \sin^2 x \, dx \\ &= \int_0^{\pi/2} \sin^2 x \, dx + \int_0^{\pi/2} \sin^2(x + \frac{\pi}{2}) \, dx \\ &= \int_0^{\pi/2} \sin^2 x \, dx + \int_0^{\pi/2} \cos^2 x \, dx \\ &= \int_0^{\pi/2} \sin^2 x + \cos^2 x \, dx \\ &= \int_0^{\pi/2} 1 \, dx \\ &= \underline{\underline{\frac{\pi}{2}}} \end{aligned}$$

Aufgabe 3

$$\text{a) } \int_0^1 \frac{1}{\sqrt{1-x}} dx = 2\sqrt{1-x} \Big|_0^1 = 0 - 2 = \underline{\underline{-2}}$$

$$\begin{aligned} \text{b) } \int_0^\infty e^{-\sqrt{x}} \, dx &= \int_0^\infty 2z \cdot e^{-z} \, dz \\ &= 2z \cdot e^{-z} \Big|_0^\infty - \int_0^\infty 2 \cdot e^{-z} \, dz \\ &= (2z + 2) \cdot e^{-z} \Big|_0^\infty \\ &= 2 - 0 = \underline{\underline{2}} \end{aligned}$$