Integriere mit Hilfe einer Substitution:

$$\int_0^{\frac{\pi}{2}} \sin(2x)\,dx$$

u = 2x $\qquad \frac{du}{dx} = 2 \Longrightarrow dx = \frac{du}{2}$

untere Grenze = 2 * 0 = 0

oberer Grenze = 2 $* \frac{\pi}{2} = \pi$

$$\frac{1}{2}\int_0^{\pi} \sin(u)\,du = -\frac{1}{2}[\cos(u)\,|_0^{\pi}] = -\frac{1}{2}[\cos(\pi) - \cos(0)] = -\frac{1}{2}[-1-1]$$
$$= 1$$

$$\int e^{(2x+1)}\,dx$$

u = 2x+1 $\qquad \frac{du}{dx} = 2 \Longrightarrow dx = \frac{du}{2}$

$$\int \frac{1}{2} e^{u}\,du = \frac{1}{2}e^{u} + c = \frac{1}{2}e^{2x+1} + c$$

$\int_0^{a} \cos(x+\pi)\,dx$

$u = x + \pi \qquad \frac{du}{dx} = 1 \Longrightarrow du = dx$

Untere Grenze = $0 + \pi$ = π

Obere Grenze = $a + \pi$

$$\int_{\pi}^{a+\pi} \cos(u)\,du = \sin(u)\,|_{\pi}^{a+\pi} = \sin(a+\pi) - \sin(\pi) = \sin(a+\pi)$$