1. Compute $\int e^{4x-9}\,dx$

$u = 4x - 9$

$du = 4\,dx$

$$\int e^u \frac{1}{4}\,du = \frac{1}{4}\int e^u du = \frac{1}{4}e^u = \frac{1}{4}e^{4x-9}$$

$$\int e^{4x-9}\,dx = \frac{1}{4}e^{4x-9}$$

2. Compute $\int x\sin(x^2+1)\,dx$

$u = x^2 + 1$

$du = 2x\,dx$ $\quad \frac{1}{2}du = x\,dx$ $\quad \frac{1}{2x}du = dx$

$$\int \sin(u)\frac{1}{2}\,du = \frac{1}{2}\cdot(-\cos(u))$$

$$= -\frac{1}{2}\cos(x^2+1)$$

$$\frac{d}{dx}\left(-\frac{1}{2}\cos(x^2+1)\right) =$$

$$-\frac{1}{2}\cdot(-\sin(x^2+1))\cdot 2x$$

$$= \sin(x^2+1)\cdot x \quad \checkmark$$

3. Compute $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$.

$u = \sqrt{x}$

4. Compute $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$.