

1. Compute $\int e^{4x-9} dx = \int e^u \frac{1}{4} du = \frac{1}{4} e^u = \frac{1}{4} e^{4x-9} + C$
 $u = 4x - 9$
 $du = 4 dx$

2. Compute $\int x \sin(x^2 + 1) dx = \int \frac{1}{2} \sin(u) du$
 $u = x^2 + 1$
 $du = 2x dx$
 $= -\frac{1}{2} \cos(u) + C$
 $= -\frac{1}{2} \cos(x^2 + 1) + C$

3. Compute $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$.
 $u = \sqrt{x}$
 $du = \frac{1}{2\sqrt{x}} dx$
 $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = \int 2e^u du$
 $= 2e^u + C$
 $= 2e^{\sqrt{x}} + C$

4. Compute $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$.
 $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = 2e^{\sqrt{x}} \Big|_1^4 = 2e^2 - 2e^0$
 $= 2(e^2 - 1)$

5. Compute $\int \frac{\arctan(x)}{1+x^2} dx = \int u du = \frac{1}{2} u^2 + C$
 $u = \arctan(x)$
 $du = \frac{1}{1+x^2} dx$
 $= \frac{1}{2} (\arctan(x))^2 + C$

6. Compute $\int \frac{x^3}{\sqrt{1-x^4}} dx = \int -\frac{1}{4} \frac{1}{\sqrt{u}} du = -\frac{1}{4} 2 u^{1/2} + C$
 $u = 1-x^4$
 $du = -4x^3 dx$
 $= -\frac{1}{2} (1-x^4)^{1/2} + C$

7. Compute $\int \frac{x}{\sqrt{1-x^4}} dx.$ $u = x^2$
 $du = 2x dx$

$\rightarrow = \int \frac{1}{2} \frac{1}{\sqrt{1-u^2}} du = \frac{1}{2} \arcsin(u) + C$
 $= \frac{1}{2} \arcsin(x^2) + C$