1. $\displaystyle\int 3x\sin(1+x^2)dx$

Solution:
$$\text{Use } u = 1 + x^2, \text{ get} \quad -\frac{3}{2}\cos\left(x^2 + 1\right) + C$$

2. $\displaystyle\int \frac{\sin(x)}{1+\cos^2(x)}dx$

Solution:
$$\text{Use } u = \cos(x), \text{ get} \quad -\arctan(\cos(x)) + C$$

3. $\displaystyle\int \frac{3e^x}{e^x - 3}dx$

Solution:
$$\text{Use } u = e^x - 3, \text{ get} \quad 3\log\left(e^x - 3\right) + C$$

4. $\displaystyle\int x(5x^2 + 2)^7 dx$

Solution:
$$\text{Use } u = 5x^2 + 2, \text{ get} \quad \frac{1}{80}\left(5x^2 + 2\right)^8 + C$$

5. $\displaystyle\int_2^3 (x-1)^3 + (x-1)^{-3} dx$

Solution:
$$\text{Use } u = x - 1, \text{ get} \quad \frac{1}{4}(x-1)^4 - \frac{1}{2(x-1)^2}\Big|_2^3 = \frac{33}{8}$$

6. $\displaystyle\int_0^1 \frac{e^x}{\sqrt{e^x + 1}}dx$

Solution:
$$\text{Use } u = e^x + 1, \text{ get} \quad 2\sqrt{e^x + 1}\Big|_0^1 = 2\sqrt{1+e} - 2\sqrt{2} \approx 1.02814$$