1. Antiderivate of $\ln(x^2+1)dx$

Solution:

$$\int \ln(x^2+1)dx = \left| \begin{matrix} u = \ln(x^2+1)\,, du = \dfrac{2xdx}{x^2+1} \\ dv = dx, v = x \end{matrix} \right| = x\ln(x^2+1) - 2\int \frac{x^2dx}{x^2+1} = x\ln(x^2+1) - 2\left(\int 1 - \frac{1}{x^2+1}\right)dx = x\ln(x^2+1) - 2(x - \operatorname{atan}(x)) + C,$$

where $C = const$

Answer: $x\ln(x^2+1) - 2(x - \operatorname{atan}(x)) + C$.

2. Antiderivate of $\frac{e^{2x}}{\sqrt{1-e^x}}dx$

Solution:

$$\int \frac{e^{2x}}{\sqrt{1-e^x}}dx = \int \frac{e^x}{\sqrt{1-e^x}}d(e^x) = |t = e^x| = \int \frac{tdt}{\sqrt{1-t}} = \left| \begin{matrix} u = \mathrm{t}, du = dt \\ dv = \dfrac{dt}{\sqrt{1-t}}, v = -2\sqrt{1-t} \end{matrix} \right| = -2t\sqrt{1-t} + 2\int \sqrt{1-t}dt = -2t\sqrt{1-t} - \frac{4}{3}\sqrt{(1-t)^3} + C$$

where $C = const$

Answer: $-\frac{2}{3}\sqrt{1-t}(t+2) + C$.