

$$\int_{du} u x^n = u x^n u - n \int_{du} u x^{n-1}$$

$$\int_{du} u x = u x u - \int_{du} 1 = u x u - u = u \underbrace{x - 1}$$

$$\int_{du} u x^2 = u x^2 u - 2 \int_{du} u x = u x^2 u - 2 \underbrace{u x u - u} = u (u x^2 - 2 u x + 2)$$

$$\int_{du}^{0|1} u x^2 = \underbrace{u x^2 u - 2 u x u + 2u}_{u=1} - \underbrace{u x^2 u - 2 u x u + 2u}_{u=0} = 2 - \underbrace{u x^2 u - 2 u x u}_{u=0} = 2$$

$$u^m x \underset{u \rightarrow 0}{\rightsquigarrow} 0$$

$$u^m x^n = \frac{1/y x^n}{y^m} = (-1)^n \frac{y x^n}{y^m} \underset{y \rightarrow \infty}{\rightsquigarrow} 0$$

$$\int_{du} u x^n u^m = \frac{u x^n u^{m+1}}{m+1} - \frac{n}{m+1} \int_{du} u x^{n-1} u^m$$

$$\int_{du} \frac{u x^n}{u} \underset{y = u x}{=} \int_{dy} y^n$$

$$u x \left[\frac{1}{2} u^2 x - \frac{1}{4} u^2 \right]$$

$$u^3 x^2 \left[\frac{1}{4} u^4 x^2 - \frac{1}{16} u^4 \right]$$

$$\frac{u x}{\sqrt{u}} \left[2\sqrt{u} (u x - 2) \right]$$

$$\sqrt{u} x \left[\frac{2}{3} \left(u x - \frac{2}{3} \right) u^{3/2} \right]$$

$$u x^2$$

$$\begin{aligned}
& u^{4u-1} \left[\left(u - \frac{1}{4} \right)^{4u-1} - u \right] \\
& u^{2u+5} \left[\left(\frac{1}{2}u^2 - \frac{25}{8} \right)^{2u+5} - \frac{1}{4}u^2 + \frac{5}{4}u \right] \\
& u^{2u} \left[\frac{1}{3}u^{3u} - \frac{1}{9}u^3 \right] \\
& u^u x^2 \\
& u^{2u+2} \left[\frac{1}{3} (u^3 + 1)^{u+1} - \frac{1}{18}u (2u^2 - 3u + 6) \right] \\
& \frac{u}{u} \left[\left(u - 1 \right)^u \right] \\
& u^{3u+7} \left[\left(u + \frac{7}{3} \right)^{3u+7} - u \right] \\
& u^{3 \cdot 3u^2+1} \left[\frac{1}{4} \left(u^4 - \frac{1}{9} \right)^{3u^2+1} - \frac{1}{8}u^4 + \frac{1}{12}u^2 \right] \\
& 6 \frac{u^5}{u} \left[u^6 \right] \\
& \frac{1}{u^u} \left[u^u \right] \\
& \frac{1}{u^u x^u} \left[u^u x^u \right] \\
& \frac{u^2}{u^2} \left[-\frac{u^2}{u} - 2\frac{u}{u} - 2u^{-1} \right] \\
& u^{u^2+1} \left[u^{u^2+1} - 2u + 2^u \right] \\
& u^3 \left[u^u x^3 - 3u^u x^2 + 6u^u x - 6u \right] \\
& u^{2u+1} x \\
& \frac{u^3}{u^2} \\
& u + \sqrt{u^2+1} \left[u^{u+\sqrt{u^2+1}} - \sqrt{u^2+1} \right] \\
& u^{u+\sqrt{u^2+1}} \left[\left(u^2 + \frac{1}{2} \right)^{u+\sqrt{u^2+1}} - \frac{1}{2}u\sqrt{u^2+1} \right]
\end{aligned}$$

$$\begin{aligned}
 & \int_{-\infty}^{\infty} \frac{e^{-u}}{1+e^{-u}} du \\
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 \end{aligned}$$

$$\int_{-\infty}^{\infty} e^{-u} \frac{1}{1+e^{-u}} du$$

$$\int_{-\infty}^{\infty} e^{-u} \frac{1}{1+e^{-u}} du = \int_{-\infty}^{\infty} \frac{e^{-u}}{1+e^{-u}} du = \int_{-\infty}^{\infty} \frac{1}{e^u + 1} du = \int_{-\infty}^{\infty} \frac{1}{1+e^u} du$$

$$\int_{-\infty}^{\infty} \frac{1}{u\sqrt{u}} du : \int_{-\infty}^{\infty} \frac{1}{u} du = +\infty : \int_{-\infty}^{\infty} \frac{1}{u} du : \int_{-\infty}^{\infty} \frac{1}{u^2} du = \frac{1}{2}$$