Derivatives of functions of e

Anti derivatives of functions of e

45.) $y = e^x \ln x$

$y' = e^x \cdot \frac{1}{x} + \ln x \cdot e^x$

51.) $y = \ln(1+e^{2x})$

$$y' = \frac{2e^{2x}}{1+e^{2x}}$$

$e^{\ln x} = x$

$e^0 = 1$

$\ln e = 1$

$\ln 1 = 0$

59.) $F(x) = \int_{\pi}^{\ln x} \cos e^t \, dt$

$$F'(x) = \cos(e^{\ln x}) \cdot \frac{1}{x}$$

$$= \frac{\cos x}{x}$$

57.) $y = e^x(\sin x + \cos x)$

$$y' = \underline{e^x(\cos x - \sin x)} + \underline{(\sin x + \cos x)e^x}$$

$$y' = e^x(\cos x - \cancel{\sin x} + \cancel{\sin x} + \cos x)$$

$$y' = 2e^x \cos x$$

(63.) $y = \ln e^{x^2} = x^2$

$(-2, 4)$ $y' = 2x$

$y'(-2) = -4$

$\ln e^{x}$

$x \ln e$

x

$y - 4 = -4(x+2)$

$y = -4x - 8 + 4$

$y = -4x - 4$

65.) $y = x^2 e^x - 2xe^x + 2e^x$

$$y = e^x(x^2 - 2x + 2)$$

$$y' = e^x(2x-2) + (x^2-2x+2)e^x$$

$$y'(1) = e^1(2-2) + (1-2+2)e^1$$

$$= \quad + e$$

$$= e$$

iii.) $\displaystyle\int \frac{e^x+e^{-x}}{e^x-e^{-x}}\,dx = \int \frac{1}{u}\,du$

$= \ln|u| + c$

$= \ln|e^x - e^{-x}| + c$

$u = e^x - e^{-x}$

$du = e^x - e^{-x}(-1)$

$= e^x + e^{-x}\,dx$

109) $\int e^x \sqrt{1-e^x}\,dx = -\int u^{1/2}\,du$

$u = 1 - e^x$

$du = 0 - e^x dx$

$= \frac{2}{3} u^{3/2} + C$

$= -\frac{2}{3}(1-e^x)^{3/2} + C$

115.)
$$\int e^{-x}\tan(e^{-x})\,dx = -\int \tan u\,du$$

$u = e^{-x}$

$du = -e^{-x}dx$

$$-\left(-\ln|\cos u|\right) + C$$

$$+\ln|\cos e^{-x}| + C$$

105.) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx = \int e^{\sqrt{x}} \cdot \frac{1}{\sqrt{x}}\,dx$

$u = x^{1/2}$

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

$2\int e^{u}\,du$

$2e^{u} + C$

$2e^{\sqrt{x}} + C$