36. $y = e^{-x^2}$

$y' = e^u \frac{du}{dx} = e^{-x^2}(-2x) =$

$= \boxed{-2x e^{-x^2}}$

39. $g(t) = (e^{-t} + e^t)^3$

$g' = 3(e^{-t}+e^t)^2(e^{-t}(-1)+e^t)$

$= \boxed{3(e^{-t}+e^t)^2(-e^{-t}+e^t)}$

42. $y = \ln\left(\frac{1+e^x}{1-e^x}\right) =$

$= \ln(1+e^x) - \ln(1-e^x)$

$= \frac{1}{1+e^x}(e^x) - \frac{1}{1-e^x}(-e^x)$

$= \frac{e^x}{1+e^x}\frac{1-e^x}{1-e^x} + \frac{e^x}{1-e^x}\left(\frac{1+e^x}{1+e^x}\right)$

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

$= \boxed{\frac{2e^x}{(1-e^{2x})}}$

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

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

$= e^x \sin x + e^x \cos x + e^x \cos x - e^x \sin x$

$= \boxed{2e^x \cos x}$

51. $y = \ln(e^{x^2})$ $(-2, 4)$

$y = x^2$

$y' = 2x = m = -4$

$4 = -4(-2) + b$

$-4 = b$

$\boxed{y = -4x - 4}$

OR $y' = \frac{1}{e^{x^2}}(e^{x^2})(2x) = 2x$

54. $y = xe^x - e^x$ $1, 0$

$y' = e^x + xe^x - e^x$

$y' = xe^x = m = (1)(e^1) = e$

$0 = e(1) + b$

$-e = b$

$\boxed{y = ex - e}$

57. $xe^y + ye^x = 1$

$(1)\, e^y + xe^y \frac{dy}{dx} + e^x \frac{dy}{dx} + e^x y = 0$

$(xe^y + e^x)\frac{dy}{dx} = -e^y - e^x y$

$\frac{dy}{dx} = \boxed{\frac{-e^y - e^x y}{xe^y + e^x}}$

87. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$ $\quad u = x^{1/2}$

$du = \frac{1}{2}x^{-\frac{1}{2}}dx$

$2du = x^{-1/2}dx$

$= 2\int e^u\,du$

$= 2e^u + C = \boxed{2e^{\sqrt{x}} + C}$

90. $\int \frac{e^{2x}}{1+e^{2x}}\,dx =$ $\quad u = 1+e^{2x}$

$du = e^{2x}(2)dx$

$\frac{1}{2}du = e^{2x}dx$

$= \frac{1}{2}\int \frac{1}{u}\,du$

$= \frac{1}{2}\ln|u| + C = \boxed{\frac{1}{2}\ln|1+e^{2x}| + C}$

93. $\int \frac{e^x + e^{-x}}{e^x - e^{-x}}\,dx =$ $\quad u = e^x - e^{-x}$

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

$= \int \frac{1}{u}\,du = \ln|u| + C$

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

96. $\int \frac{e^{2x} + 2e^x + 1}{e^x}\,dx =$

$= \int e^x + 2 + e^{-x}\,dx =$

$\int e^x + 2\,dx + \int e^{-x}\,dx$ $\quad u = e^{-x}$

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

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

$= e^x + 2x + \int -u\,du =$

$= \boxed{e^x + 2x - e^{-x} + C}$

99. $\int_0^1 e^{-2x}\,dx =$ $\quad u = -2x$

$du = -2\,dx$

$-\frac{1}{2}du = dx$

$\int -\frac{1}{2}e^u\,du =$

$-\frac{1}{2}e^{-2x}\Big|_0^1 =$

$-\frac{1}{2}e^{-2} - \frac{1}{2}e^0 = \frac{-1}{2e^2} + \frac{1}{2}\frac{e^2}{e^2}$

$= \boxed{\frac{-1+e^2}{2e^2}}$

102. $\int_{-2}^{0} x^2 e^{x^3/2}\,dx$ $\quad u = \frac{1}{2}x^3$

$du = \frac{3}{2}x^2dx$

$\frac{2}{3}du = x^2dx$

$= \int \frac{2}{3}e^u\,du =$

$\frac{2}{3}e^u = \frac{2}{3}e^{x^3/2}\Big|_{-2}^{0}$

$= \frac{2}{3}e^0 - \frac{2}{3}e^{\frac{1}{2}(-2^3)}$ $\quad e^{-\frac{2}{2}^3} = e$

$= \frac{2}{3} - \frac{2}{3}e^{-4} = \frac{e^4}{e^4}\frac{2}{3} - \frac{2}{3e^4}$

$\boxed{\frac{2e^4 - 2}{3e^4}}$

105. $\int_0^{\pi/2} e^{\sin \pi x} \cos \pi x \, dx$ $\quad u = \sin \pi x$

$du = \pi \cos \pi x \, dx$

$\frac{1}{\pi} du = \cos \pi x \, dx$

$= \int \frac{1}{\pi} e^u \, du =$

$\frac{1}{\pi} e^{\sin \pi x} \Big|_0^{\pi/2} =$

$\frac{1}{\pi}\left(e^{\sin \pi/2} - e^{\sin 0}\right)$

$\boxed{\frac{1}{\pi}\left(e^{\sin \frac{\pi}{2}} - 1\right)}$

107. $\frac{dy}{dx} = x e^{ax^2}$

$u = ax^2$

$du = 2ax \, dx$

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

$y = \int x e^{ax^2} dx$

$= \int \frac{1}{2a} e^u \, du$

$= \boxed{\frac{1}{2a} e^{ax^2} + C}$