

Ex. 4

$$d) \int \frac{2e^x - 2e^{-x}}{(e^x + e^{-x})^2} dx$$

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

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

$$du = \underline{(e^x - e^{-x})} dx$$

$$2 \int \frac{e^x - e^{-x}}{(e^x + e^{-x})^2} dx$$

$$2 \int \frac{1}{u^2} du$$

$$2 \int u^{-2} du$$

$$2 \left[ \frac{u^{-1}}{-1} \right] + C \rightarrow \frac{-2}{u} + C$$

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

Ex. 5

Solve the differential equation.

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

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

$$\frac{dy}{dx} = (e^x - e^{-x})^2$$

$$y = \int (e^x - e^{-x})^2 dx$$

$$y = \int (e^x - e^{-x})(e^x - e^{-x}) dx$$

$$y = \int e^{2x} - e^{\cancel{x} \cdot e^{-x}} - e^{-x} e^{\cancel{x}} + e^{-2x} dx$$

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

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

$$u = 2x$$

$$du = 2 dx$$

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

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

$$\frac{1}{2} e^u - 2x - \frac{1}{2} e^{-u}$$

$$\frac{1}{2} e^{2x} - 2x - \frac{1}{2} e^{-2x} + C$$

$$u = -2x$$

$$du = -2 dx$$

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