$$\frac{dy}{dx} = y - x$$

$y = uv$

$$\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$u\frac{dv}{dx} + v\frac{du}{dx} = y - x = uv - x$$

$$\begin{cases} u\left(\frac{dv}{dx} - v\right) = 0 & (1) \\ v\frac{du}{dx} = -x & (2) \end{cases}$$

$$(1) \Rightarrow \frac{dv}{dx} = v$$

$$v = e^x + C_1$$

$$C_1 = 0 \Rightarrow v = e^x$$

$$② \Rightarrow \frac{du}{dx} = -\frac{x}{v} = -\frac{x}{e^x} = -xe^{-x}$$

$$u = \int -xe^{-x}\,dx = \int xe^{-x}\,d(-x)$$

$$= \int x\,de^{-x} = xe^{-x} - \int e^{-x}\,dx$$

$$= xe^{-x} + e^{-x} + C_2$$

$$y = uv = (xe^{-x} + e^{-x} + C_2)e^x$$

$$= x + 1 + C_2 e^x$$