$$\boxed{z = \frac{1}{x} e^{-\frac{y}{x}}}$$

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

$$zx = e^{-\frac{y}{x}}$$

1

$$\ln(zx) = -\frac{y}{x}$$

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$$y = -x \ln(zx)$$

$$y' = -\ln(zx) - \cancel{x} \frac{z'x + z}{z\cancel{x}}$$

$$= -\ln(zx) - \frac{z'}{z} x - 1$$

$$\cancel{-\ln(zx)} + \frac{z'}{z} \cancel{x} \cancel{-1} = \cancel{-\ln(zx)} + z\cancel{x} \cancel{-1}$$

$$z' = z^2$$

$$\frac{dz}{dx} = z^2$$

$$\int z^{-2}\,dz = \int dx$$

$$\frac{-1}{z} = x + C$$

$$\Rightarrow z = \frac{-1}{x + C} = \frac{1}{x} e^{-\frac{y}{x}}$$

2

$$\ln\left(\frac{-x}{x+C}\right) = \frac{-y}{x}$$

$$\Leftrightarrow \quad y = x \ln\left(\frac{x+C}{-x}\right)$$

$$y(1) = \ln\Big(\underbrace{\frac{C+1}{-1}}_{=1}\Big) = 0$$

$$\Leftrightarrow \quad C+1 = -1$$

$$\Leftrightarrow \quad C = -2$$

$$\Rightarrow \quad y(x) = x \ln\left(\frac{2-x}{x}\right)$$