

2-3

$$(y' + 1) \cdot \frac{y+x}{x+3} = \frac{y+x}{x+3}$$

$$t = \frac{y+x}{x+3} \Rightarrow \frac{dt}{dx} = \frac{(x+3) d(y+x) - (y+x) d(x+3)}{(x+3)^2 dx}$$

$$= \frac{dy + dx}{(x+3) dx} - \frac{(y+x) dx}{(x+3)^2 dx} = \frac{1}{x+3} \cdot \frac{dy}{dx} + \frac{1}{x+3} - \frac{y+x}{(x+3)^2} =$$

$$= \frac{1}{x+3} \cdot \frac{dy}{dx} + \frac{3-y}{(x+3)^2} \Rightarrow \frac{dy}{dx} = (x+3) \frac{dt}{dx} - \frac{3-y}{x+3}$$



$$\left( (x+3)t' - \frac{3-y}{x+3} + 1 \right) \ln t = t \Rightarrow$$

$$\left( (x+3)t' + \frac{x+y}{x+3} \right) \ln t = t \Rightarrow$$

$$((x+3)t' + t) \ln t = t$$

$$(x+3) \ln t \frac{dt}{dx} + t \ln t = -1$$

$$(x+3) \ln t dt = (t - t \ln t) dx$$

$$\frac{\ln t dt}{t - t \ln t} = \frac{dx}{x+3}$$

$$\int \frac{\ln t dt}{t - t \ln t} = \int \left\{ \begin{aligned} u &= t - t \ln t \\ du &= (1 - \ln t - t \cdot \frac{1}{t}) dt = -\ln t dt \end{aligned} \right\} =$$

$$= \int -\frac{du}{u} = -\ln |u| = -\ln |t - t \ln t| = -\ln t (1 - \ln t)$$

$$= -\ln |t| - \ln |1 - \ln t|$$

$$\int \frac{dx}{x+3} = \ln |x+3|$$

$$-\ln |t| - \ln |1 - \ln t| = \ln |x+3|$$



$$-\ln \left| \frac{y+x}{x+3} \right| - \ln \left| 1 - \ln \left( \frac{y+x}{x+3} \right) \right| = \ln |x+3|$$

$$-\ln \left| \frac{y+x}{x+3} - \frac{y+x}{x+3} \ln \left( \frac{y+x}{x+3} \right) \right| = \ln |x+3|$$

$$\ln \left| \frac{y+x}{x+3} - \frac{y+x}{x+3} \ln \left( \frac{y+x}{x+3} \right) \right| = \ln \left| \frac{1}{x+3} \right|$$

$$\frac{y+x}{x+3} - \frac{y+x}{x+3} \ln \left( \frac{y+x}{x+3} \right) = \frac{1}{x+3}$$

$$y+x - (y+x) \ln \left( \frac{y+x}{x+3} \right) = 1$$

$$\text{Ans: } 1 - \ln \left( \frac{y+x}{x+3} \right) = \frac{1}{y+x}$$