

$$7y' = x+y$$

$$u = x+y$$

$$y' = u' - 1$$

§ 9.3 #5

$$7(u' - 1) = u$$

$$7u' - 7 = u$$

$$7 \frac{du}{dx} - u = 7$$

$$\frac{7(u' - 1)}{u} = 1$$

$$7 du - u dx = 7 dx$$

$$7 du = (u + 7) dx$$

$$\frac{7 du}{u+7} = dx$$

$$v = u+7$$

$$dv = du$$

$$7 \ln |u+7| = x + C$$

$$\ln |u+7| = \frac{1}{7}x + C$$

$$|u+7| = |x+y+7| = e^{\frac{1}{7}x} e^C = Ce^{\frac{1}{7}x}$$

$$\Rightarrow x+y+7 = \pm Ce^{\frac{1}{7}x} \Rightarrow y = \pm Ce^{\frac{1}{7}x} - x - 7$$

$$u = x+y \Rightarrow \frac{d}{dx}(u) = \frac{d}{dx}(x+y) \Rightarrow \frac{du}{dx} = 1 + \frac{dy}{dx}, \text{ but } 7 \frac{dy}{dx} = x+y = u,$$

$$\text{so } 7 \frac{du}{dx} = 7+u \Rightarrow 7 \frac{du}{7+u} = dx \quad [u \neq -7] \Rightarrow 7 \int \frac{du}{7+u} = \int dx \Rightarrow$$

$$\ln |7+u| = x/7 + C \Rightarrow |7+u| = e^{x/7+C} \Rightarrow 7+u = \pm e^C e^{x/7} \Rightarrow$$

$$u = \pm e^C e^{x/7} - 7 \Rightarrow x+y = \pm e^C e^{x/7} - 7 \Rightarrow y = K e^{x/7} - x - 7, \text{ where } K = \pm e^C \neq 0.$$

If $u = -7$, then $-7 = x+y \Rightarrow y = -x-7$, which is just $y = K e^{x/7} - x - 7$ with $K = 0$. Thus, the general solution is $y = K e^{x/7} - x - 7$, where $K \in \mathbb{R}$.

Tomorrow @ Midnight is due date for Test.

☞ 10 Maple can help. Plotting Parametric Equations.

`with(plots):`

`plot([5 + 2 cos(Pi·t), 3 + 2 sin(Pi·t), t=1..2], color=black)`

To plot $x = 5 + 2\cos(\pi t)$

$y = 3 + 2\sin(\pi t)$

for $1 \leq t \leq 2$.

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