Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

2. $x_t' = e^{\lambda x} F(x, y), \quad y_t' = g(y) F(x, y).$

Solution:

$$x = \varphi(y), \quad \int \frac{dy}{g(y) F(\varphi(y), y)} = t + C_2,$$

where

$$\varphi(y) = \begin{cases} -\dfrac{1}{\lambda} \ln \left[C_1 - \lambda \displaystyle\int \frac{dy}{g(y)} \right] & \text{if } \lambda \neq 0, \\[4mm] C_1 + \displaystyle\int \frac{dy}{g(y)} & \text{if } \lambda = 0, \end{cases}$$

C_1 and C_2 are arbitrary constants.