

Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

1. 
$$x'_t = x^n F(x, y), \quad y'_t = g(y) F(x, y).$$

Solution:

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

where

$$\varphi(y) = \begin{cases} \left[ C_1 + (1-n) \int \frac{dy}{g(y)} \right]^{\frac{1}{1-n}} & \text{if } n \neq 1, \\ C_1 \exp\left[ \int \frac{dy}{g(y)} \right] & \text{if } n = 1, \end{cases}$$

 $C_1$  and  $C_2$  are arbitrary constants.

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http://eqworld.ipmnet.ru/en/solutions/sysode/sode0301.pdf