

Systems of Ordinary Differential Equations > Linear Systems of Three and More Equations

1. 
$$x_t' = ax$$
,  $y_t' = bx + cy$ ,  $z_t' = dx + ky + pz$ . Solution:

$$\begin{split} x &= C_1 e^{at}, \\ y &= \frac{bC_1}{a-c} e^{at} + C_2 e^{ct}, \\ z &= \frac{C_1}{a-p} \left( d + \frac{bk}{a-c} \right) e^{at} + \frac{kC_2}{c-p} e^{ct} + C_3 e^{pt}, \end{split}$$

where  $C_1$ ,  $C_2$ , and  $C_3$  are arbitrary constants.

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http://eqworld.ipmnet.ru/en/solutions/sysode/sode0201.pdf