

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

4. 
$$x_t' = (a_1f + g)x + a_2fy + a_3fz$$
,  $y_t' = b_1fx + (b_2f + g)y + b_3fz$ ,  $z_t' = c_1fx + c_2fy + (c_3f + g)z$ . Here,  $f = f(t)$  and  $g = g(t)$ .

The transformation

$$x = \exp \left[ \int g(t) \, dt \right] u, \quad y = \exp \left[ \int g(t) \, dt \right] v, \quad z = \exp \left[ \int g(t) \, dt \right] w, \quad \tau = \int f(t) \, dt$$

leads to the system of constant coefficient linear differential equations

$$u'_{\tau} = a_1 u + a_2 v + a_3 w, \quad v'_{\tau} = b_1 u + b_2 v + b_3 w, \quad w'_{\tau} = c_1 u + c_2 v + c_3 w.$$

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