

$$x(t) = x_1 \rightarrow \dot{x}_1 = \frac{dx_1}{dt} = \frac{dx(t)}{dt} = x_2$$

$$\frac{dx(t)}{dt} = x_2 \rightarrow \dot{x}_2 = \frac{dx_2}{dt} = \frac{d^2x(t)}{dt^2} = x_3$$

$$\frac{d^2x(t)}{dt^2} = x_3 \rightarrow \dot{x}_3 = \frac{dx_3}{dt} = \frac{d^3x(t)}{dt^3} = x_4$$

$$\vdots$$

$$\frac{d^{n-2}x(t)}{dt^{n-2}} = x_{n-1} \rightarrow \dot{x}_{n-1} = \frac{dx_{n-1}}{dt} = \frac{d^{n-1}x(t)}{dt^{n-1}} = x_n$$

$$\frac{d^{n-1}x(t)}{dt^{n-1}} = x_n \rightarrow \dot{x}_n = \frac{dx_n}{dt} = \frac{d^nx(t)}{dt^n}$$

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$$u = a_n \frac{d^nx(t)}{dt^n} + a_{n-1}x_n + a_{n-2}x_{n-1} + \dots + a_1x_2 + a_0x_1$$

$$\frac{d^nx(t)}{dt^n} = \dots$$