Parameters of the dynamic system:

$A \in \mathbb{R}^{n \times n}$, $B \in \mathbb{R}^{n \times 1}$, $C \in \mathbb{R}^{1 \times n}$

$$\vec{x}'(t) = A\vec{x}(t) + Bu(t)$$
$$y(t) = C\vec{x}(t) + Du(t)$$

(a) Continuous-time form

$$\left.\begin{aligned} \overline{A} &= \exp(\Delta A) \\ \overline{B} &= \Delta B \end{aligned}\right\} \text{Discretization}$$

$$\vec{x}(t) = \overline{A}\vec{x}(t-1) + \overline{B}u(t)$$
$$y(t) = C\vec{x}(t) + Du(t)$$

(b) Discrete-time form