

Dengan masukan $u(t) \neq 0$,

$$\dot{x} = \frac{dx(t)}{dt} = Ax(t) + Bu(t)$$

Misalkan solusi non-homogenous:

$$x(t) = e^{At} c(t)$$

$$\frac{dx(t)}{dt} = \underbrace{A e^{At} c(t)} + e^{At} \frac{dc(t)}{dt}$$

$$= \cancel{Ax(t)} + e^{At} \frac{dc(t)}{dt} = \cancel{Ax(t)} + Bu(t)$$

$$[e^{At}] \frac{dc(t)}{dt} = Bu(t)$$

$$\frac{dc(t)}{dt} = [e^{At}]^{-1} Bu(t)$$

$$c(t) = \int [e^{At}]^{-1} Bu(t) dt$$

$$e^{-At} \equiv [e^{At}]^{-1}$$