從信號與系統到控制

單元：連續控制-2

用基本元件 建立 連續時間系統

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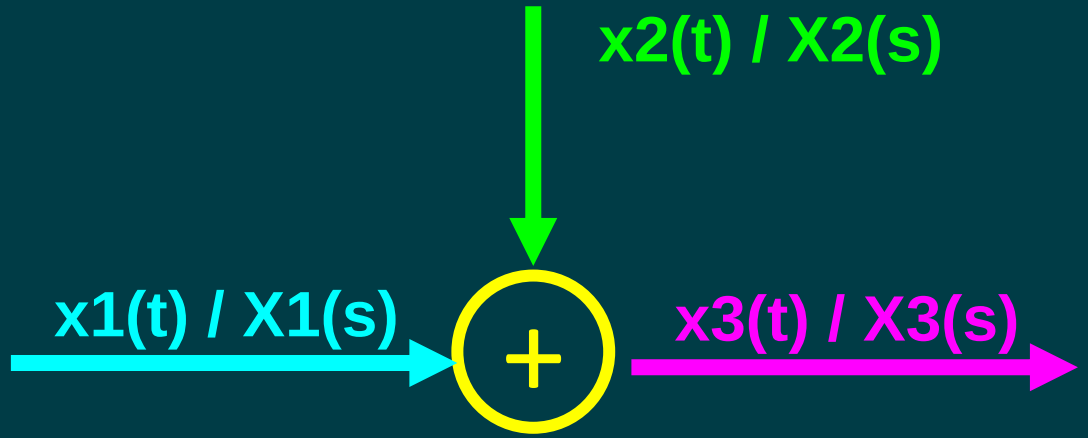
單元學習目標與大綱

- 討論用基本元件來建立一個連續時間系統
- 基本元件：加法、增益、微分、積分

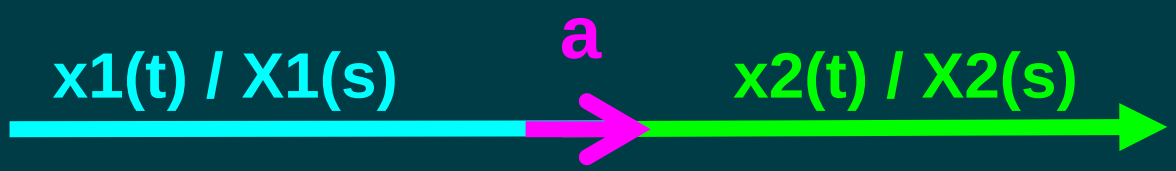
建立系統的基本元件 – 加法器



$$x3(t) = x1(t) + x2(t)$$

$$X3(s) = X1(s) + X2(s)$$

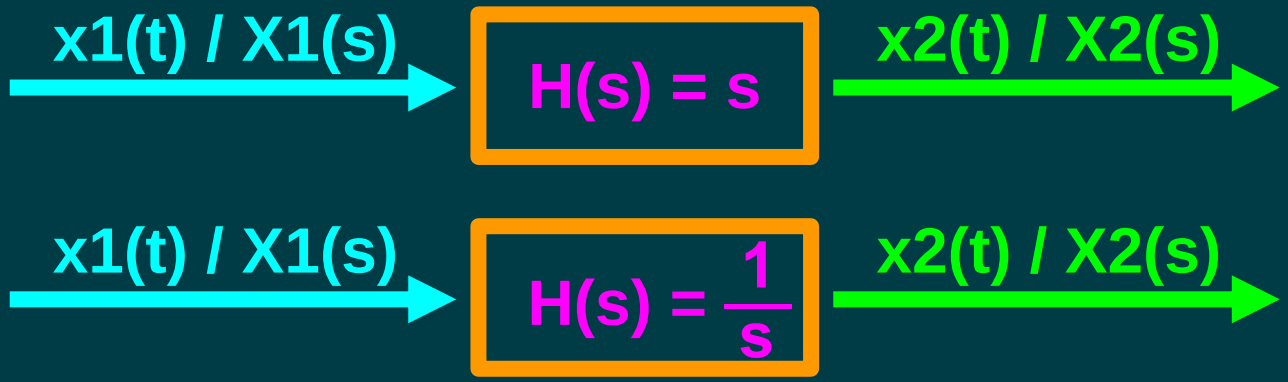
建立系統的基本元件 – 增益



$$x2(t) = a\ x1(t)$$

$$X2(s) = a\ X1(s)$$

建立系統的基本元件 – 微分與積分



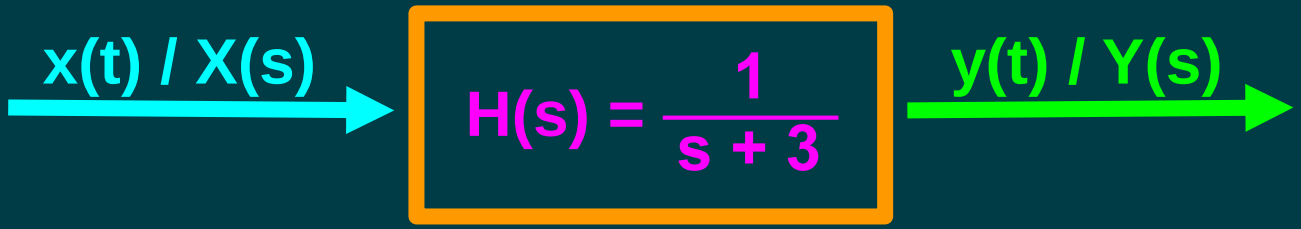
$X2(s) = s\ X1(s)$

$x2(t) = \frac{d}{dt} x1(t)$

$X2(s) = \frac{1}{s} X1(s)$

$x2(t) = \int_{-\infty}^{t} x1(q)\, dq$

連續時間系統的範例

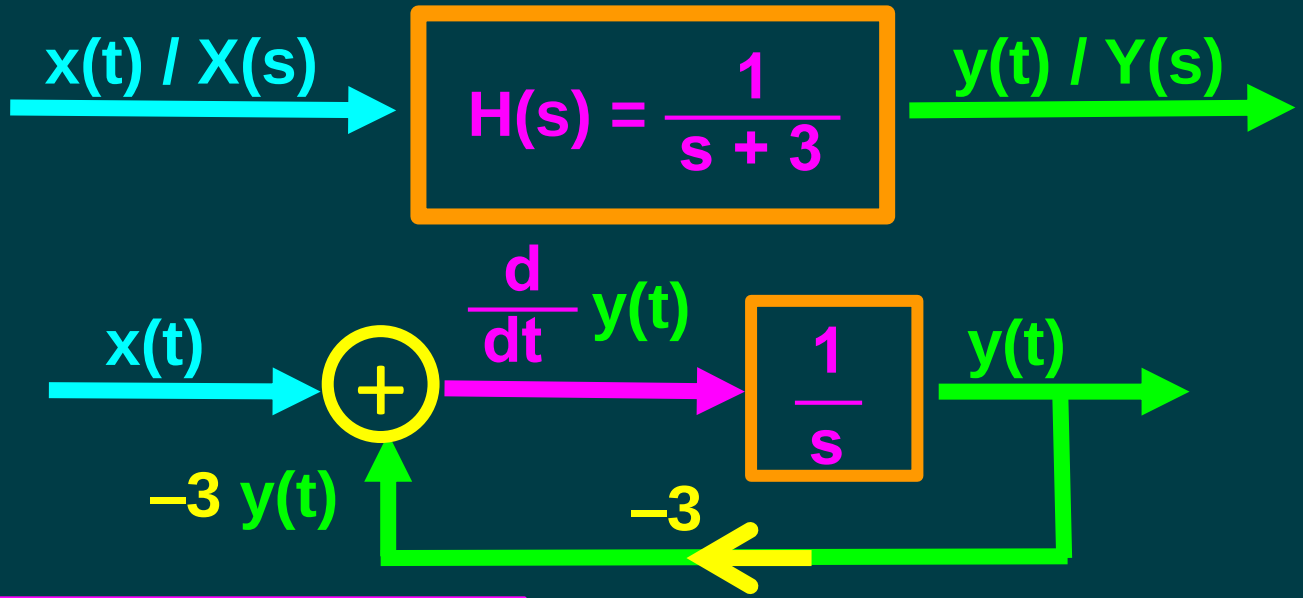


$$Y(s) = \frac{1}{s+3} X(s)$$

$$(s+3)\, Y(s) = X(s)$$

$$s\,Y(s) + 3\,Y(s) = X(s) \qquad \frac{d}{dt} y(t) + 3\,y(t) = x(t)$$

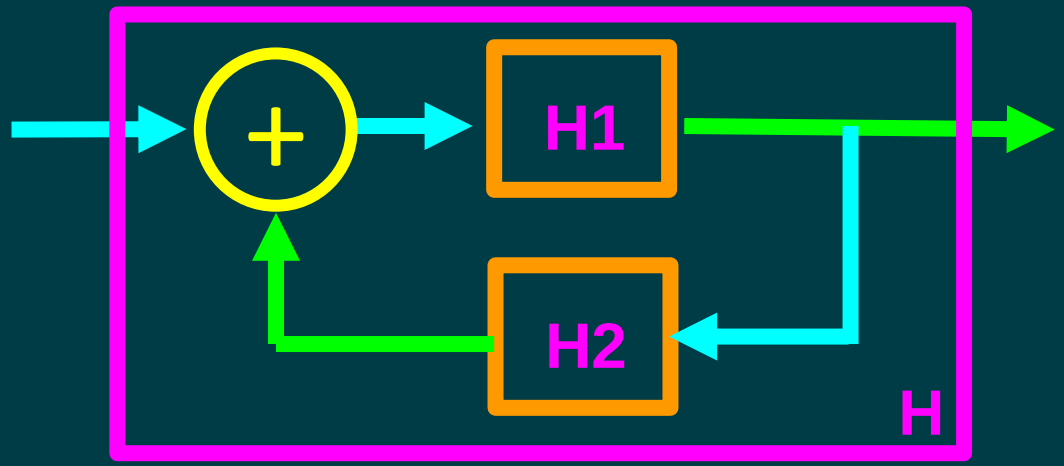
連續時間系統的範例



$$\frac{d}{dt}y(t) = x(t) - 3y(t)$$

$$\frac{d}{dt}y(t) + 3y(t) = x(t)$$

兩個系統的連接 – 迴授

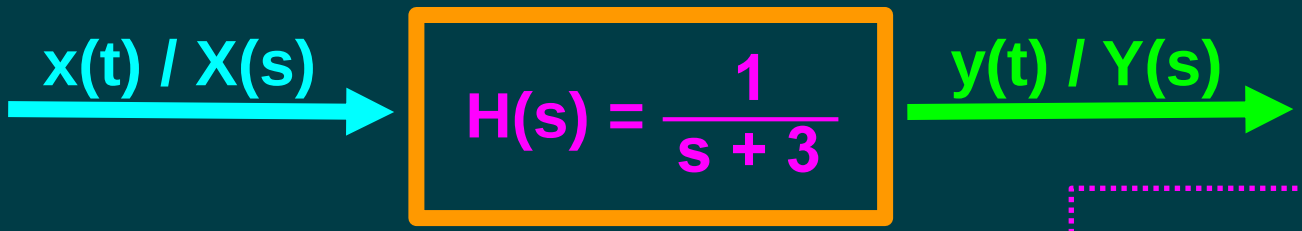


$$H = \frac{H1}{(1 - H1 \bullet H2)}$$

$$= \frac{\frac{1}{s}}{\left(1 - \frac{1}{s} \bullet (-3)\right)}$$

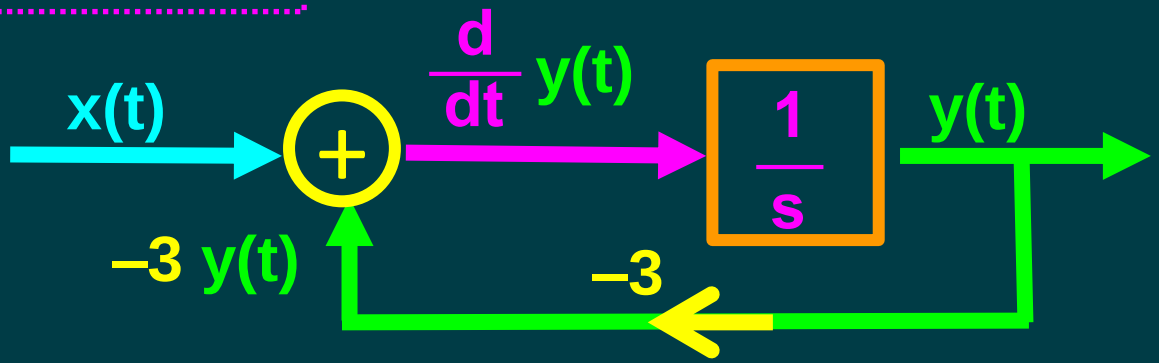
$$= \frac{1}{(s + 3)}$$

連續時間系統的範例

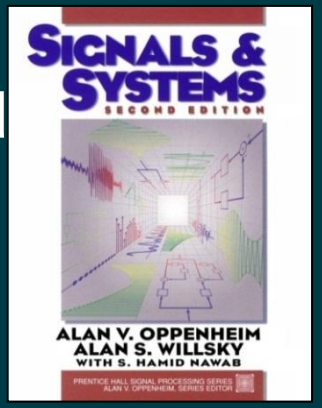


$$\frac{d}{dt}\,y(t) = x(t) - 3\,y(t)$$

$$Y(s) = \frac{1}{s+3}\,X(s)$$



參考文獻



- Alan V. Oppenheim, Alan S. Willsky, S. Hamid
  Signals & Systems,
  Prentice Hall, 2nd Edition, 1997

- **SciLab**:
  Open source software for numerical computation
  http://www.scilab.org/