從信號與系統到控制

單元：離散摺積-7

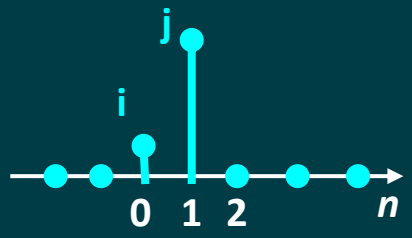
摺積計算 與 脈衝響應 對系統的影響

授課老師：連　豐　力

單元學習目標與大綱

- 離散 摺積計算
- 離散 脈衝響應
- 脈衝響應 對 系統輸出 的影響

離散 摺積計算



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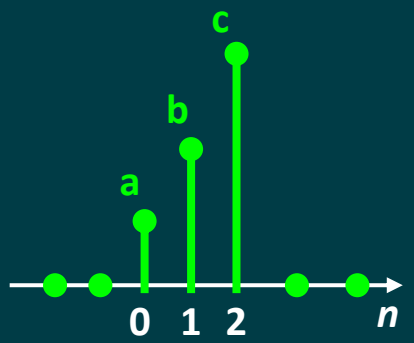
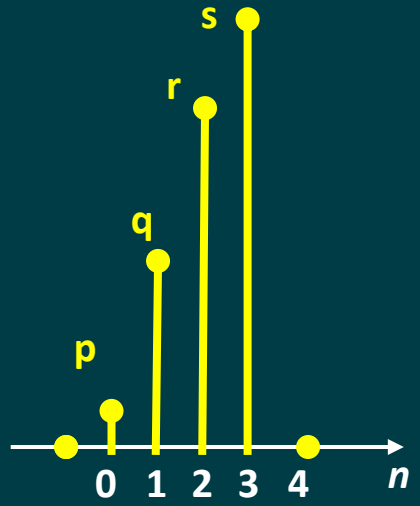
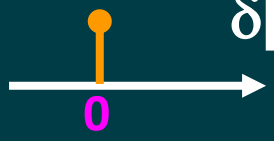




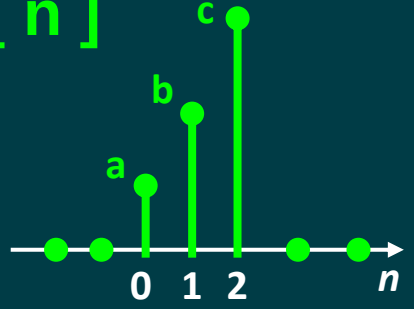
x[n] * h[n]

$$= y[n] = \sum_{k=-\infty}^{+\infty} x[k]\, h[n-k]$$

離散 脈衝響應



δ[n] → LTI → h[n]

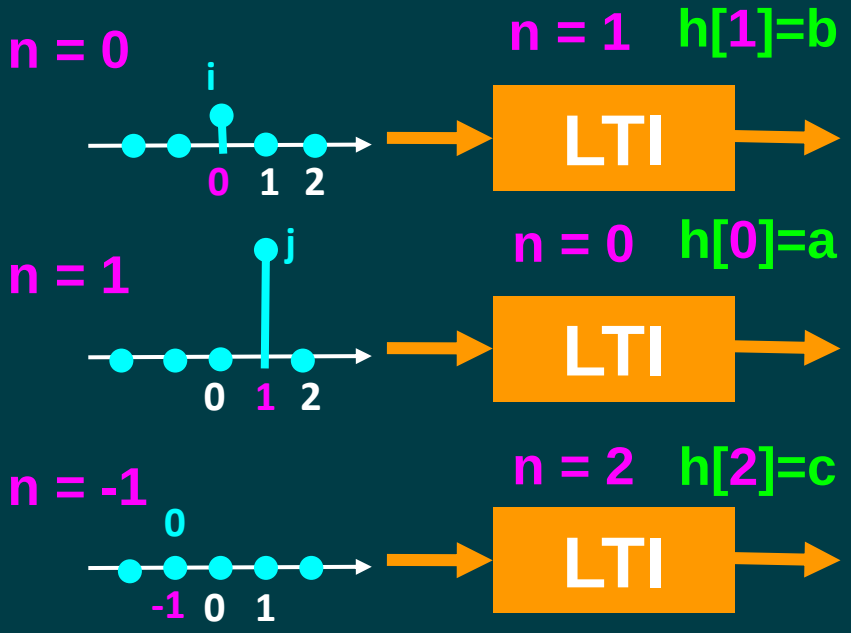


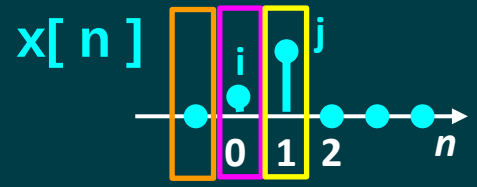
h[n]

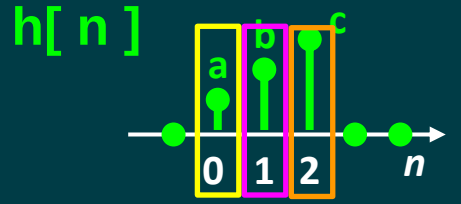
x[n] → LTI → y[n]

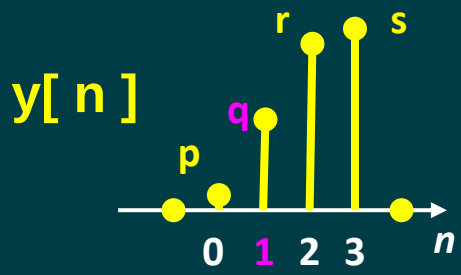
= x[n] * h[n]

脈衝響應 對 系統輸出 的影響



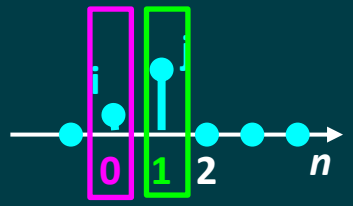


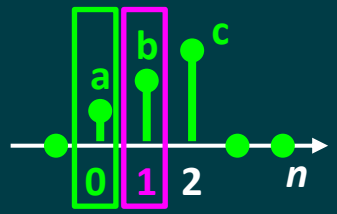




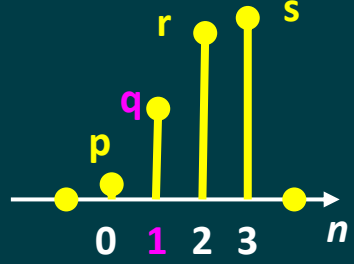
$$y[1] = q = 0 * c + i * b + j * a$$

脈衝響應 對 系統輸出 的影響





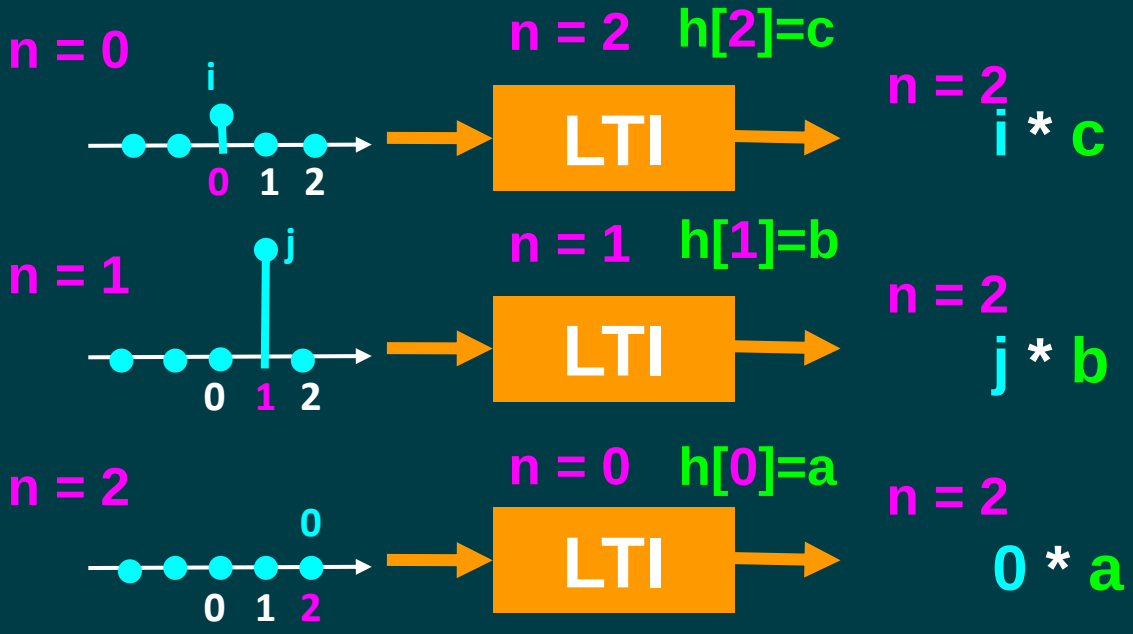
h[n]

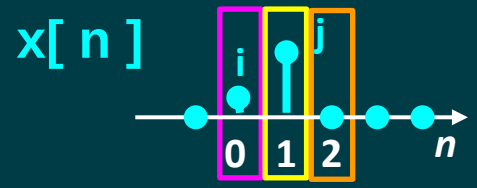


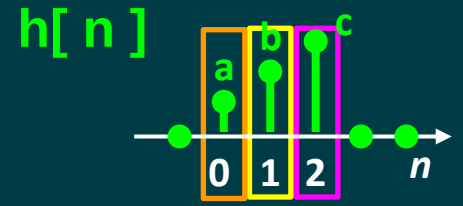
x[n] → LTI → y[n]

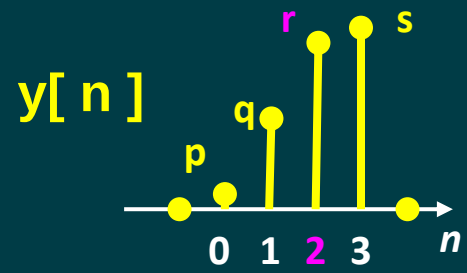
y[1] = q = i * b + j * a

脈衝響應 對 系統輸出 的影響



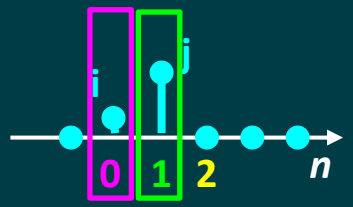


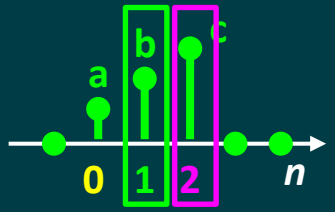




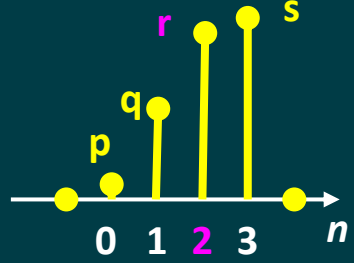
$$y[2] = r = i * c + j * b + 0 * a$$

脈衝響應 對 系統輸出 的影響





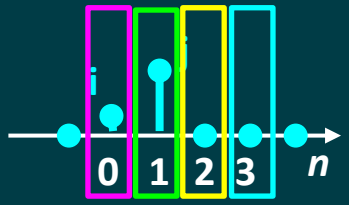
h[n]

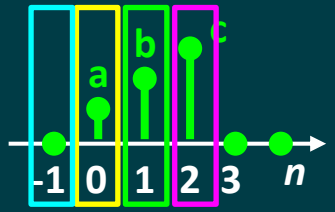


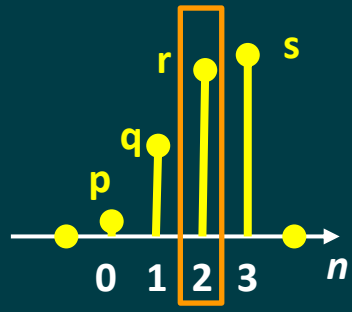
x[n] → LTI → y[n]

y[2] = r = i * c + j * b

脈衝響應 對 系統輸出 的影響







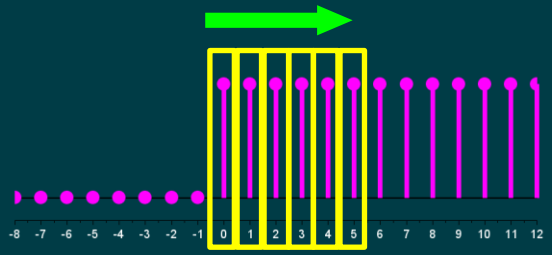
$h[n]$

$x[n]$ → **LTI** → $y[n]$

$$y[n] = x[n] * h[n] = \sum_{k=-\infty}^{+\infty} x[k]\,h[n-k]$$

脈衝響應 對 系統輸出 的影響

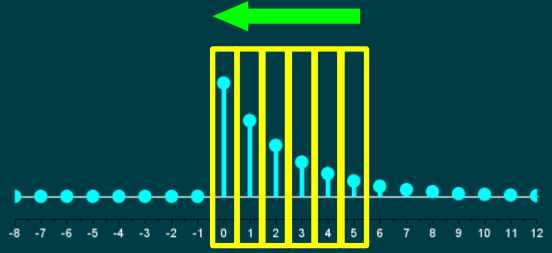
$$\sum_{k=-\infty}^{+\infty} x[k]\,h[n-k]$$



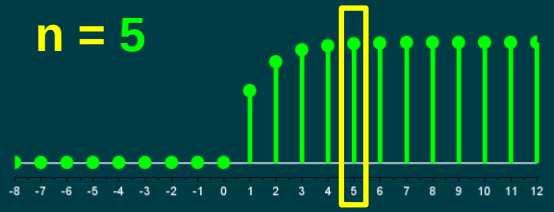
h[n]

y[n]	x[n]	h[n]
5	5	0
	4	1
	3	2
	2	3
	1	4
	0	5

x[n] → LTI → y[n]

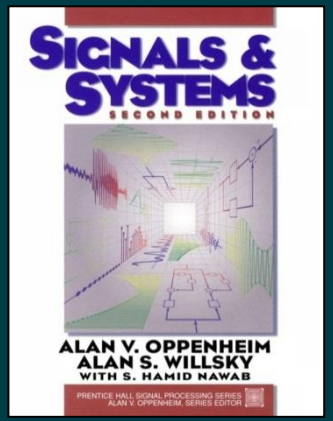


n = 5



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/