

Virgawan Ibrahim

20211008

Pemrosesan sinyal & optima (D)

Latihan konvolusi 2D

$$x(n_1, n_2)$$

1	4	1
2	5	3

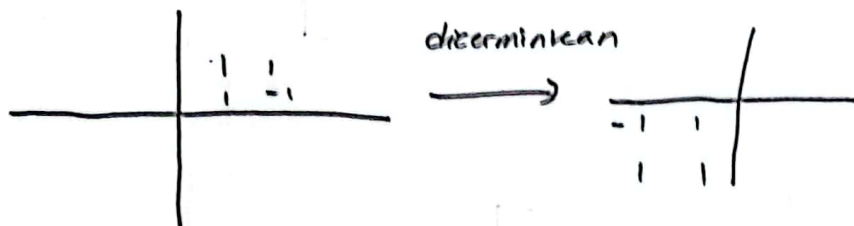
$\ast \ast$

$$h(n_1, n_2)$$

1	1
1	-1

es konvolusi sinyal diatas

$$g(n_1, n_2) = \sum_{k_1=-\infty}^{\infty} \sum_{k_2=-\infty}^{\infty} x(k_1, k_2) h(n_1 - k_1, n_2 - k_2)$$



sehingga didapat konvolusi sinyal sebagai berikut ini :

$$\left[\begin{array}{l} \begin{array}{c} \begin{array}{ccc} \cdot & -1 & (1,2) \end{array} \\ \begin{array}{ccc} 1 & & \end{array} \end{array} \Rightarrow 1(0) + (2) = 2 \\ \begin{array}{c} \begin{array}{ccc} \cdot & & \end{array} \\ \begin{array}{ccc} \begin{array}{ccc} \cdot & 1 & (1,5) \end{array} \\ \begin{array}{ccc} 1 & & \end{array} \end{array} \Rightarrow -1(2) + 5 = 3 \\ \begin{array}{c} \begin{array}{ccc} \cdot & & \end{array} \\ \begin{array}{ccc} \begin{array}{ccc} \cdot & 1 & (1,3) \end{array} \\ \begin{array}{ccc} 2 & & \end{array} \end{array} \Rightarrow -5 + 3 = -2 \\ \begin{array}{c} \begin{array}{ccc} \cdot & & \end{array} \\ \begin{array}{ccc} \begin{array}{ccc} \cdot & 1 & (-1,3) \end{array} \\ \begin{array}{ccc} 2 & & \end{array} \end{array} \Rightarrow -3 + 1(0) = -3 \end{array} \right]$$

$$\begin{aligned}
 & \cdot \begin{array}{cc} -1 & 1 \\ 1 & 1 \end{array} \begin{array}{cc} (1.1) & 9 \\ 1 & (1.2) \end{array} \begin{array}{cc} 5 & 3 \end{array} \Rightarrow 1(1) + 1(2) = 3 \\
 & \cdot \begin{array}{cc} (-1.1) & (1.1) \\ 1 & (1.2) \end{array} \begin{array}{cc} 1 & 3 \end{array} \Rightarrow -1 + 1 + 2 + 5 = 10 \\
 & \cdot \begin{array}{cc} 1 & (-1.1) \\ 2 & (1.5) \end{array} \begin{array}{cc} (1.1) & (1.3) \end{array} \Rightarrow -1 + 1 + 5 + 3 = 5 \\
 & \cdot \begin{array}{cc} 1 & 1 \\ 2 & 5 \end{array} \begin{array}{cc} (-1.1) & (1.3) \end{array} \begin{array}{cc} 1 & 1 \end{array} \Rightarrow -1 + 3 + 0 + 0 = 2
 \end{aligned}$$

$$\begin{aligned}
 & \cdot \begin{array}{cc} -1 & 1 \\ 1 & 1 \end{array} \begin{array}{cc} (1.1) & 9 \\ 2 & 5 \end{array} \begin{array}{cc} 3 & 1 \end{array} \Rightarrow 1 \\
 & \cdot \begin{array}{cc} -1 & 1 \\ 1 & (1.1) \end{array} \begin{array}{cc} (1.1) & 1 \\ 2 & 5 \end{array} \begin{array}{cc} 3 & 3 \end{array} \Rightarrow 5 \\
 & \cdot \begin{array}{cc} 1 & (-1) \\ 2 & 5 \end{array} \begin{array}{cc} (1.1) & (1.1) \end{array} \begin{array}{cc} 1 & 1 \end{array} \Rightarrow 9 + 1 = 5 \\
 & \cdot \begin{array}{cc} 1 & 1 \\ 2 & 5 \end{array} \begin{array}{cc} (-1.1) & (1.1) \end{array} \begin{array}{cc} 1 & 1 \end{array} \Rightarrow 9
 \end{aligned}$$

Hasil akhir :

$$q(n_1, n_2) =$$

1	5	5	9
3	10	5	2
2	3	-2	-3