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 NRP : 5009211036  
 Course : Pemrosesan Sinyal dan Optimisasi D

### Latihan Soal 2D Convolution

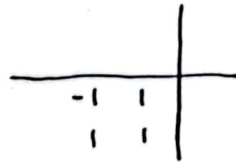


Hasil konvolusinya adalah sebagai berikut :

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

#### Step 1

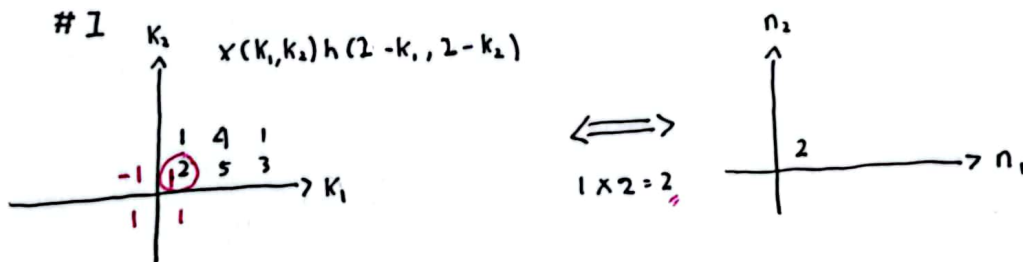
Melakukan pencerminan  $h(n_1, n_2)$  terhadap origin (0,0) sehingga didapatkan



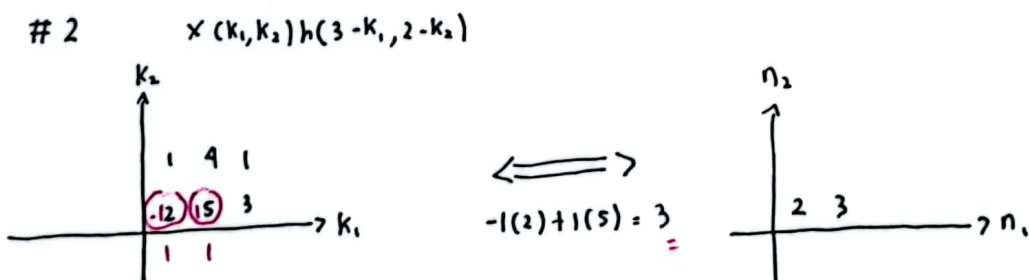
#### Step 2

Konvolusikan;

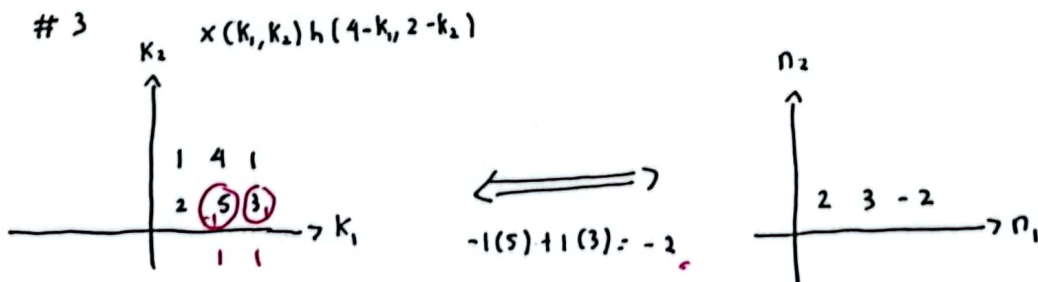
# 1

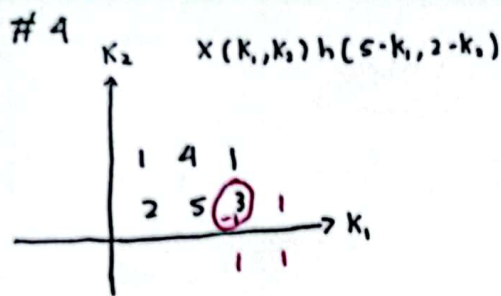


# 2

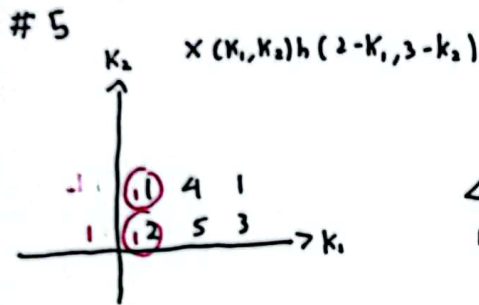
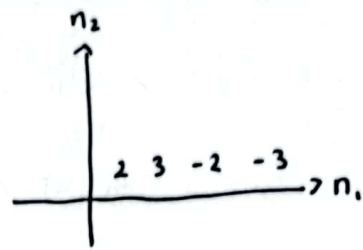


# 3

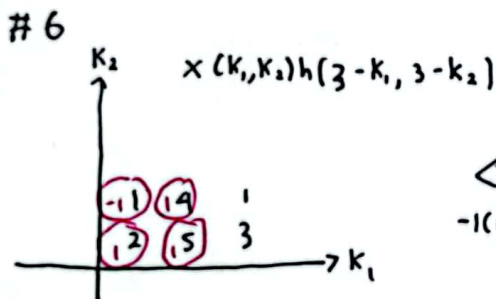
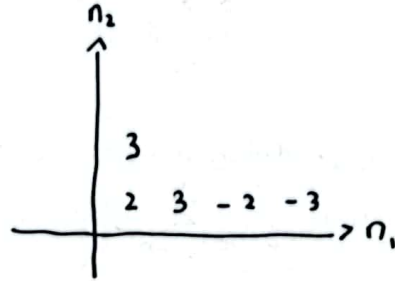




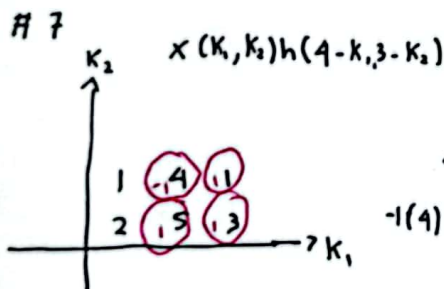
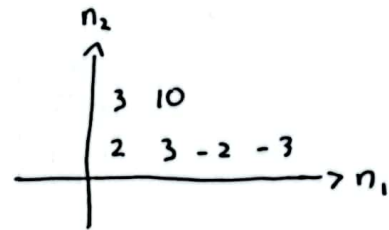
$$\Longleftrightarrow -1(3) = -3$$



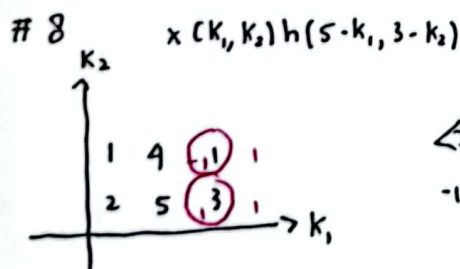
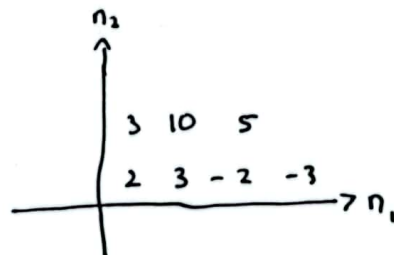
$$\Longleftrightarrow 1(1) + 1(2) = 3$$



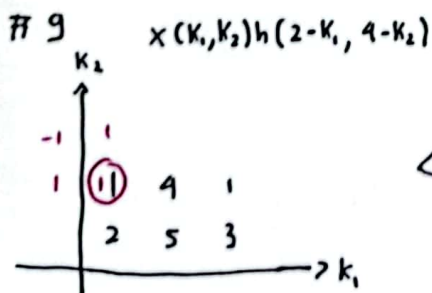
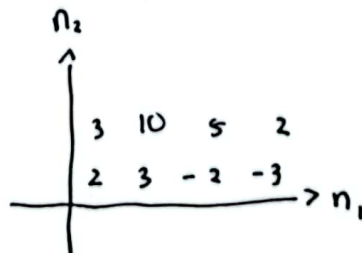
$$\Longleftrightarrow -1(1) + 1(4) + 1(2) + 1(5) = 10$$



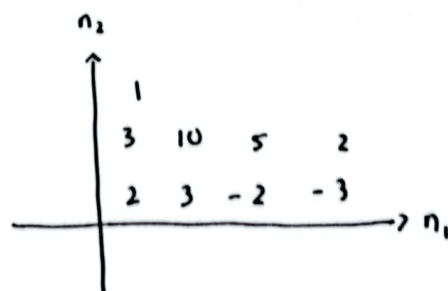
$$\Longleftrightarrow -1(4) + 1(1) + 1(5) + 1(3) = 5$$



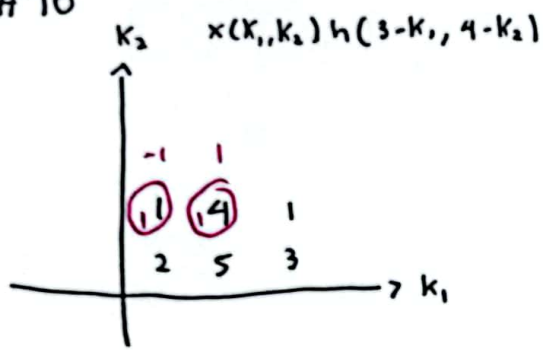
$$\Longleftrightarrow -1(1) + 1(3) = 2$$



$$\Longleftrightarrow 1(1) = 1$$

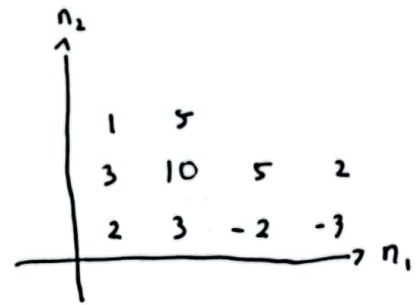


# 10

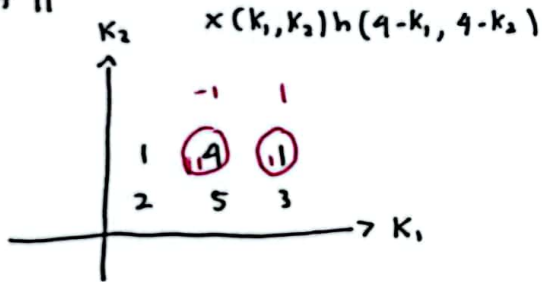


$$\Longleftrightarrow$$

$$1(1) + 1(4) = 5$$

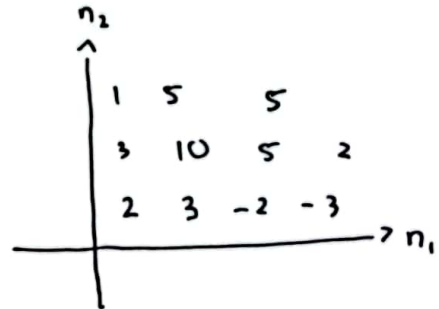


# 11

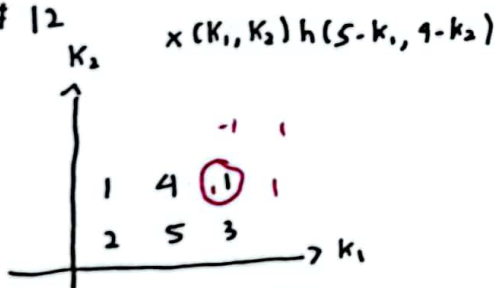


$$\Longleftrightarrow$$

$$1(4) + 1(1) = 5$$

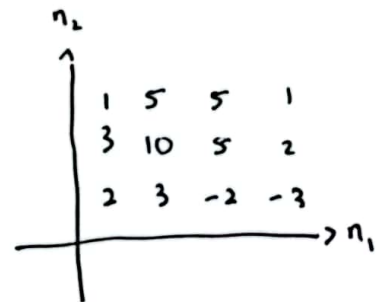


# 12



$$\Longleftrightarrow$$

$$1(1) = 1$$



The result is;

