2D functions f & g:

$$f = f(x,y),\ g = g(x,y)$$

2D Convolution:

$$(f * g)(x,y) = \sum_n \sum_m f(n,m) * g(x-n, y-m) \tag{1}$$

Convolution theorem (2D):

$$\begin{aligned}
\mathscr{F}[f * g] &= \sum_x \sum_y (f * g)(x,y)\ e^{-i\omega x}\ e^{-ivy} && (2)\\
&= \sum_x \sum_y \sum_n \sum_m f(n,m) g(x-n, y-m)\ e^{-i\omega x}\ e^{-ivy} && (3)\\
&= \sum_n \sum_m f(n,m) \sum_x \sum_y g(x-n, y-m)\ e^{-i\omega x}\ e^{-ivy} && (4)\\
&= \sum_n \sum_m f(n,m)\ \hat{g}(\omega, v)\ e^{-i\omega n} e^{-ivm} && (5)\\
&= \hat{f}(\omega, v)\ \hat{g}(\omega, v) && (6)\\
& && (7)
\end{aligned}$$