# LECTURE 12

## Convolution

$$F(x) = \int_{-\infty}^{\infty} f_1(x-x')\, f_2(x')\, dx'$$

$f_1$: true image

$f_2$: smearing effect

Fourier transform: product of transforms

$$G(k) = 2\pi\, g_1(k)\, g_2(k)$$

## Dirac $\delta$-function

$$\delta(x) = 0 \quad \text{for} \quad x \neq 0$$

$$\int_{-\infty}^{\infty} \delta(x)\, dx = 1$$

infinitely narrow, infinite "spike"

Fourier transform: plane wave

$$\frac{1}{2\pi}\int_{-\infty}^{\infty} e^{-ikx}\, \delta(x-x_0)\, dx = \frac{1}{2\pi}\, e^{-ikx_0}$$