27) Given $\quad g = h * f$

Taking fourier transform

$$G = HF$$

$$F = \frac{G}{H}$$

{ capital letters denote fourier transform }

Since h is gradient operator, it will be high pass filter which will be close to 0 for low frequencies. So, we can't extract low frequency components in image.

For 2D gradients,

$$g_x = h_x * f$$

$$g_y = h_y * f$$

Take fourier transform

$$G_x = H_x F$$

$$G_y = H_y F$$

$$\Rightarrow f = F^{-1}\left(\frac{G_x}{H_x}\right) \quad \text{or} \quad F^{-1}\left(\frac{G_y}{H_y}\right)$$

Here also since H_x and H_y are high pass filters, we'll face similar problem.

$H_x(u,v) \to 0$ when u is small

$H_y(u,v) \to 0$ when v is small

So we can use $\frac{G_y}{H_y}$ when u is small but v is significant and $\frac{G_x}{H_x}$ when v is small but u significant. However, when both u and v are small, we can't extract those components of F.