

Question 4.

Analytical Proof

$$\frac{4}{=} \quad f(x,y) = \begin{cases} 0 & x \neq 101 \\ 255 & x = 101 \end{cases}$$

$$\therefore f(x,y) = 255 \delta(x-101)$$

$$F(u,v) = \iint f(x,y) e^{-j2\pi(ux+vy)} dx dy$$

$$= \iint 255 \delta(x-101) e^{-j2\pi(ux+vy)} dx dy$$

$$= \int 255 \delta(x-101) e^{-2\pi j u x} dx \int e^{-j2\pi v y} dy$$

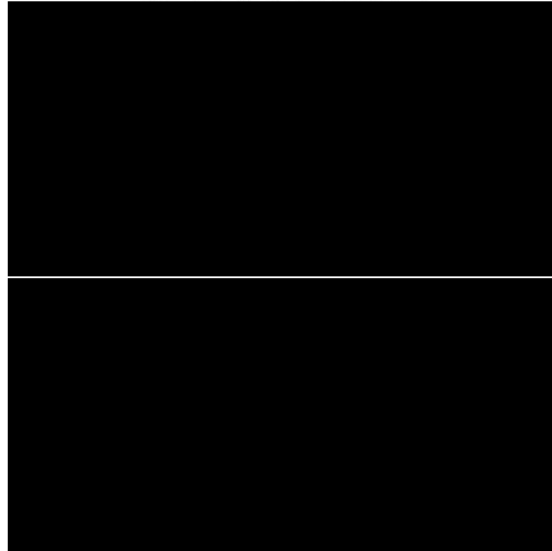
$$= 255 e^{-j2\pi \times 101 u} \times \delta(v)$$

$$= 255 e^{-j202\pi u} \delta(v)$$

Result from Matlab

1. Image

Image with only 255 values at 101th row.



2. Frequency response

Frequency Response.

