

Assignment 2 answer key

1. Problem 1

The vertical and horizontal FOV is 33.4 and 43.6 degree respectively. This question is fairly simple, and can be seen clearly with diagram

Part b and c both answers are $\approx .37$ mm.

2. Problem 2

One way to prove this is using definition:

$$\begin{aligned}\frac{d}{dx} f * g(x) &= \lim_{\delta \rightarrow 0} \frac{f * g(x + \delta) - f * g(x)}{\delta} \\ &= \lim_{\delta \rightarrow 0} \frac{\int_{-\infty}^{\infty} f(x + \delta - \tau)g(\tau)d\tau - \int_{-\infty}^{\infty} f(x - \tau)g(\tau)d\tau}{\delta} \\ &= \lim_{\delta \rightarrow 0} \frac{\int_{-\infty}^{\infty} f(x + \delta - \tau)g(\tau) - f(x - \tau)g(\tau)d\tau}{\delta} \\ &= \lim_{\delta \rightarrow 0} \frac{\int_{-\infty}^{\infty} [f(x + \delta - \tau) - f(x - \tau)]g(\tau)d\tau}{\delta} \\ &= \int_{-\infty}^{\infty} \lim_{\delta \rightarrow 0} \frac{f(x + \delta - \tau) - f(x - \tau)}{\delta} g(\tau)d\tau \\ &= \int_{-\infty}^{\infty} f'(x - \tau)g(\tau)d\tau \\ &= \frac{df}{dx} * g(x)\end{aligned}$$

The other equation can be prove similarly with variable substituted.