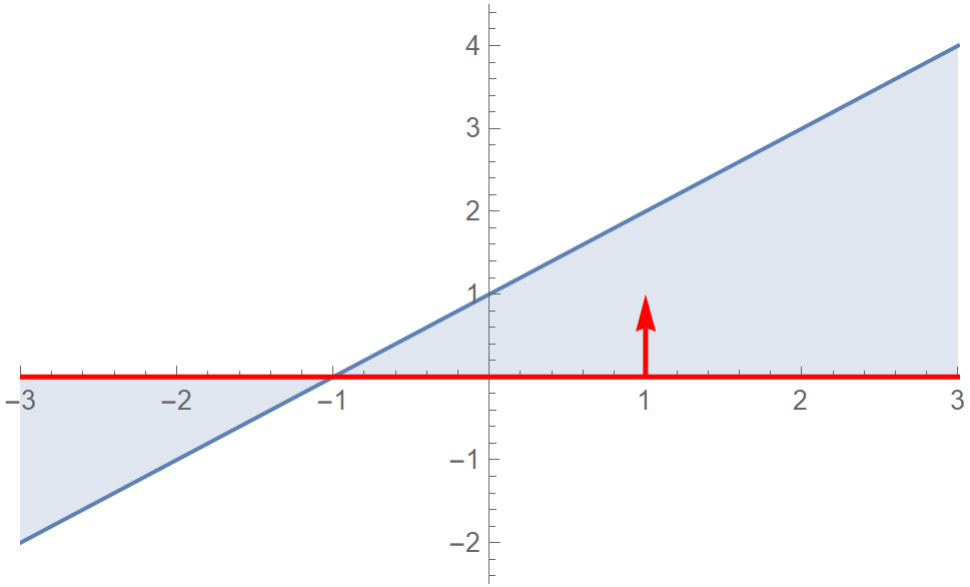
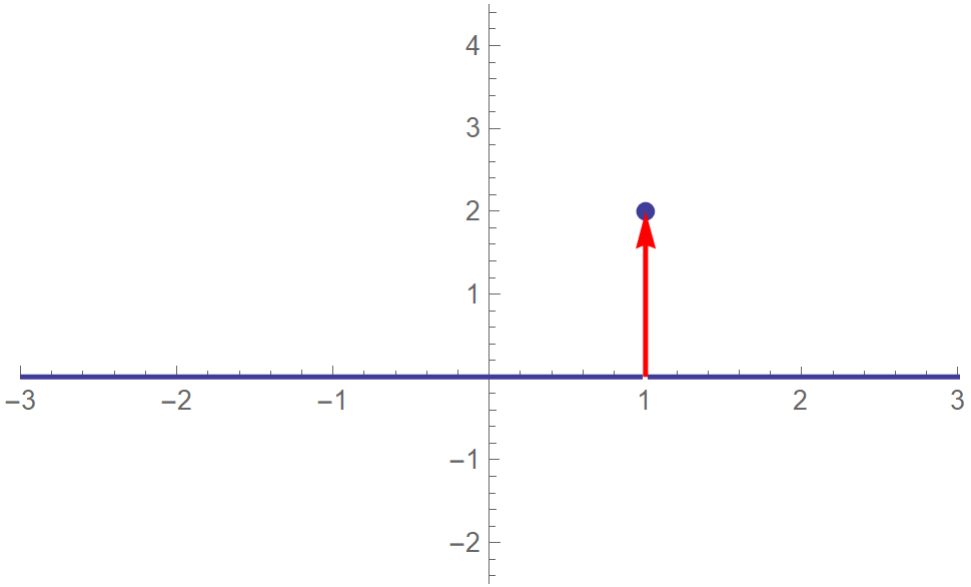
# Example 1

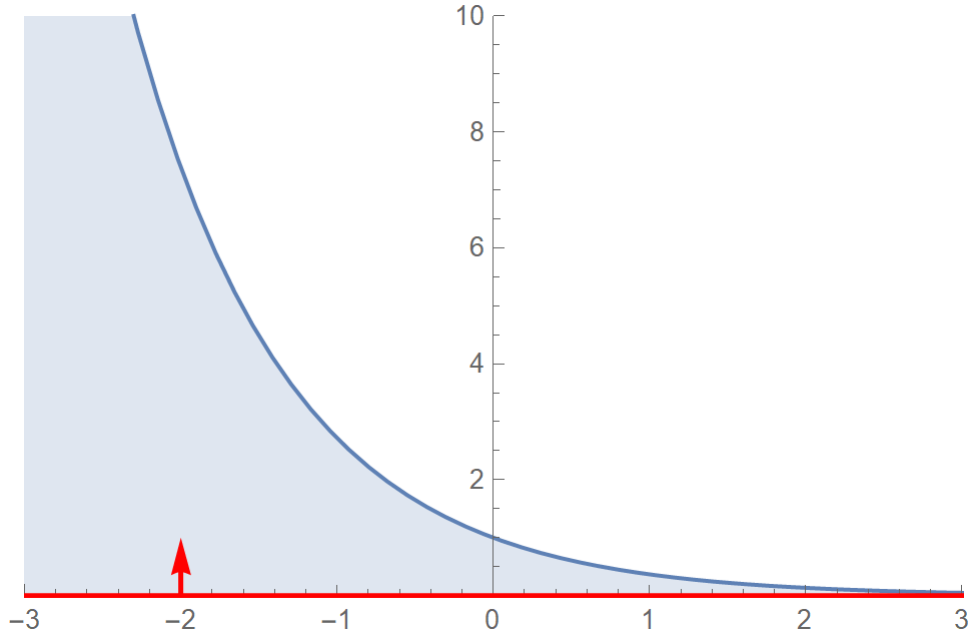
$$\int_{-\infty}^{\infty} (t+1)\delta(t-1)dt$$

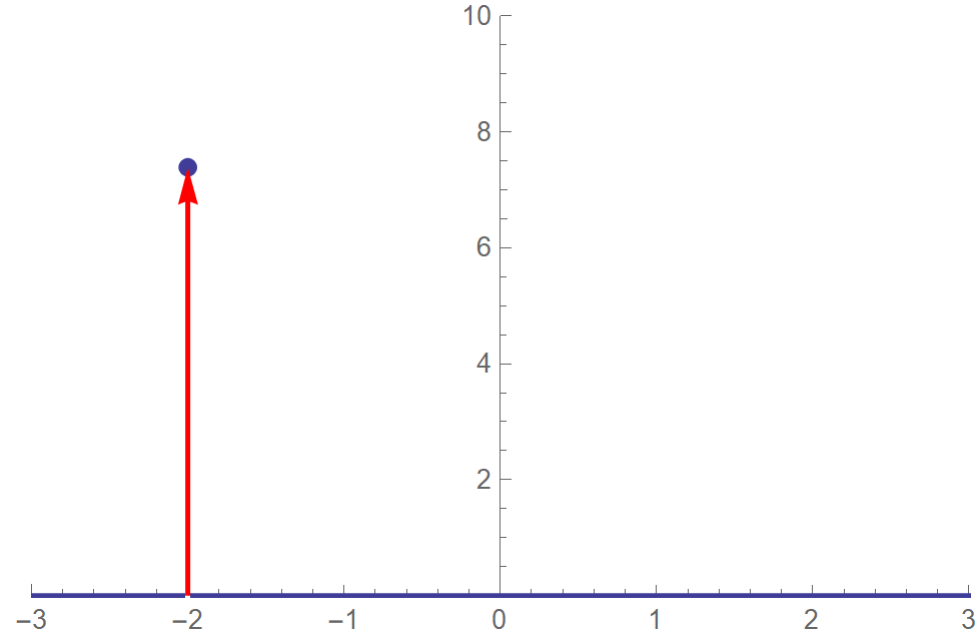


# Example 2

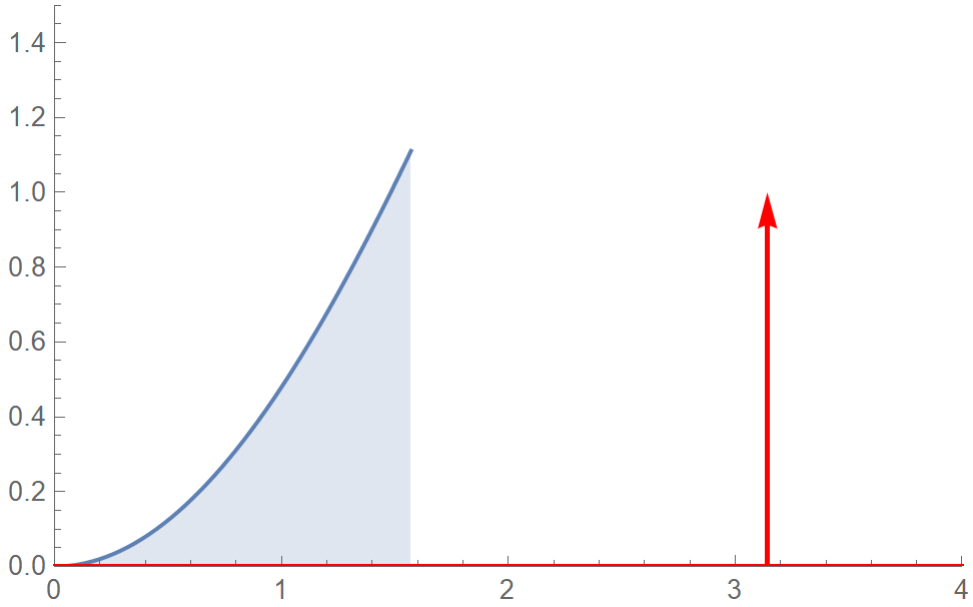
$$\int_{-\infty}^{\infty} exp(-t)\delta(t+2)dt$$



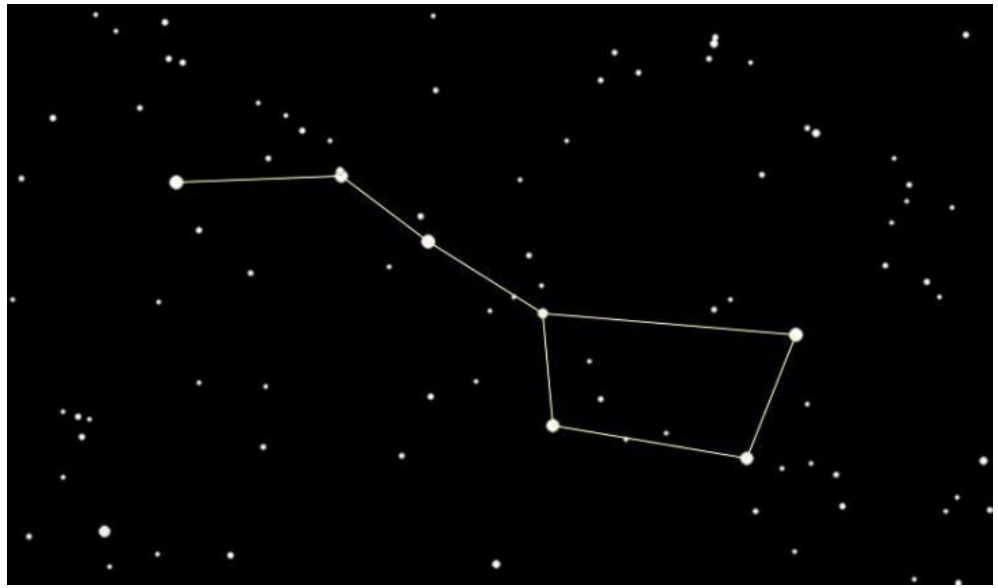
# Example 3

$$\int_0^{\pi/2} t\sin\left(\frac{t}{2}\right)\delta(\pi - t)dt$$

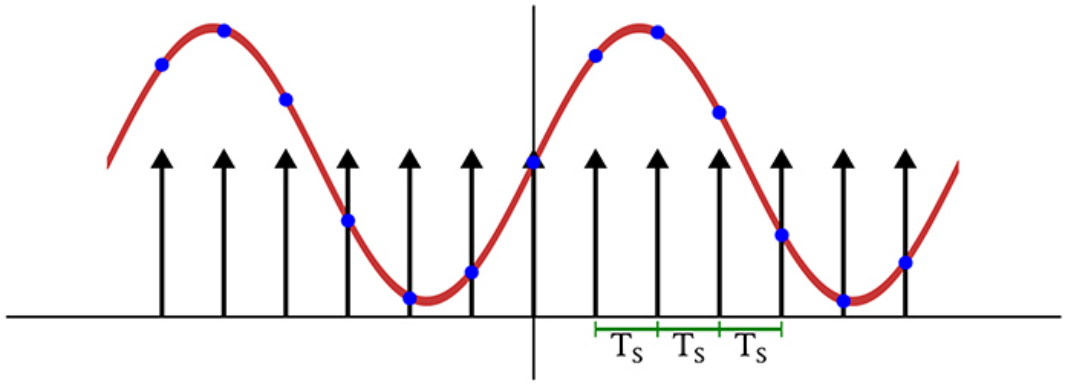


# Delta Functions in Optics

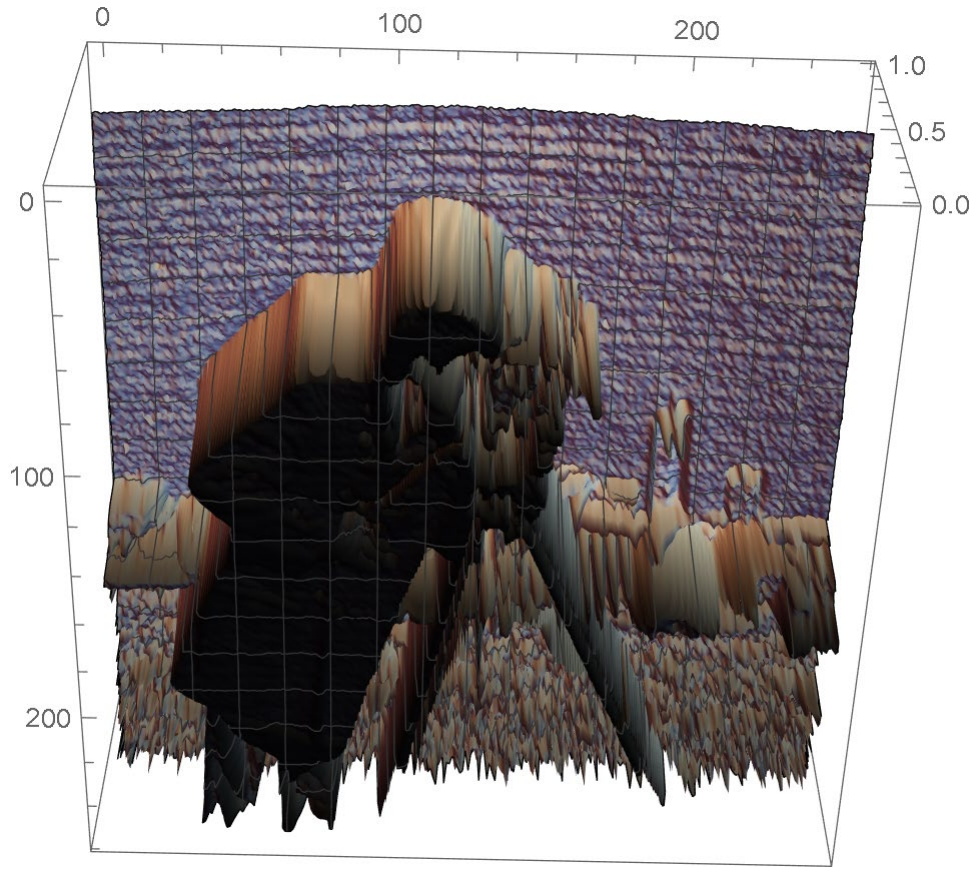
- Point Source of Light



- Sampling

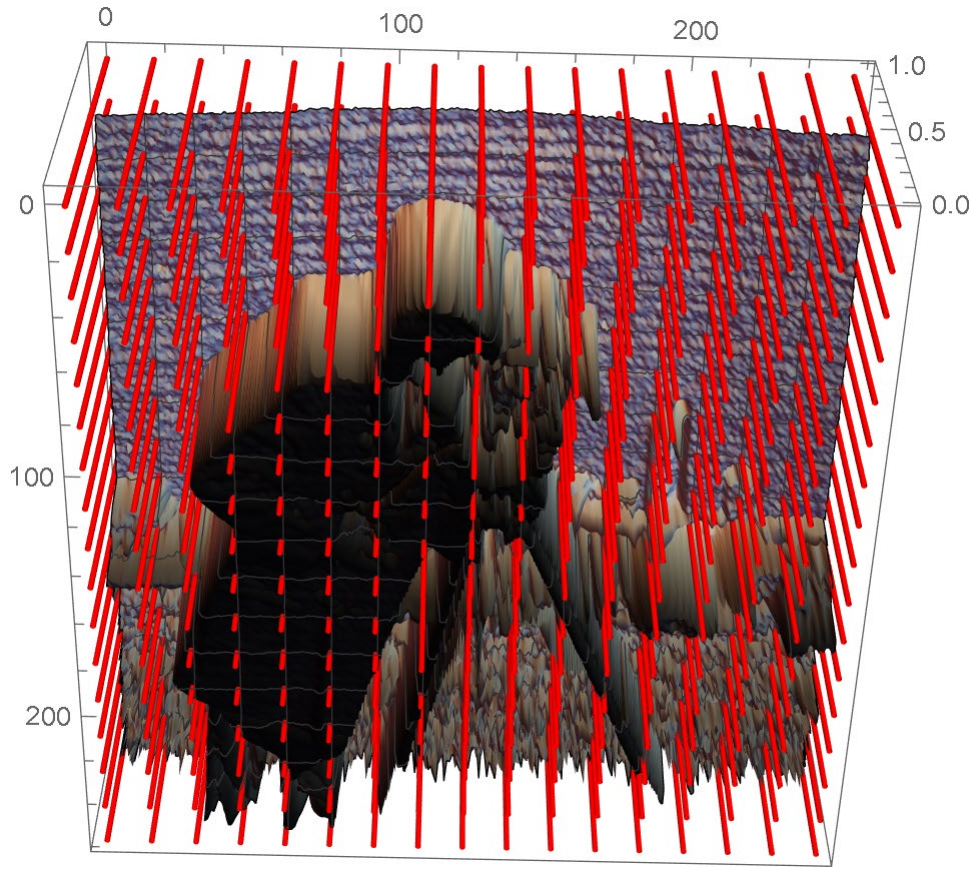


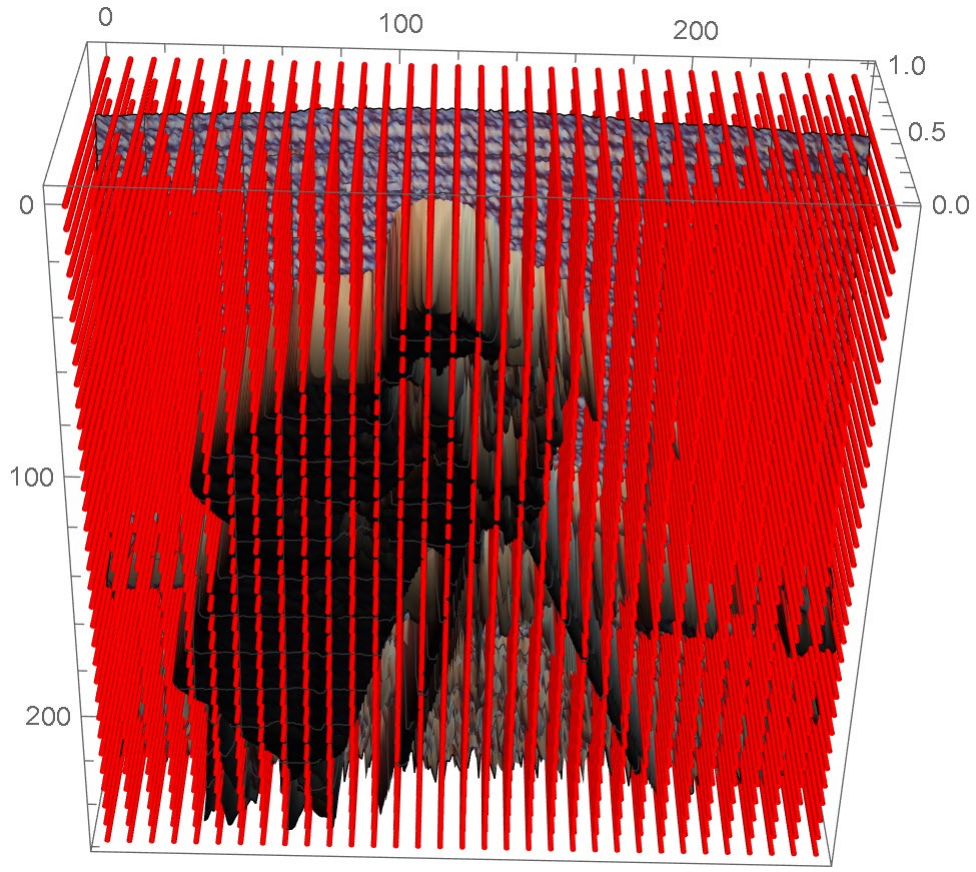
# Image Sampling




The image formed on a camera sensor is simply a 2D continuous function of irradiance values $i(x, y)$. Technically, the image is also a function of wavelength, but we usually consider red, green and blue bands separately.

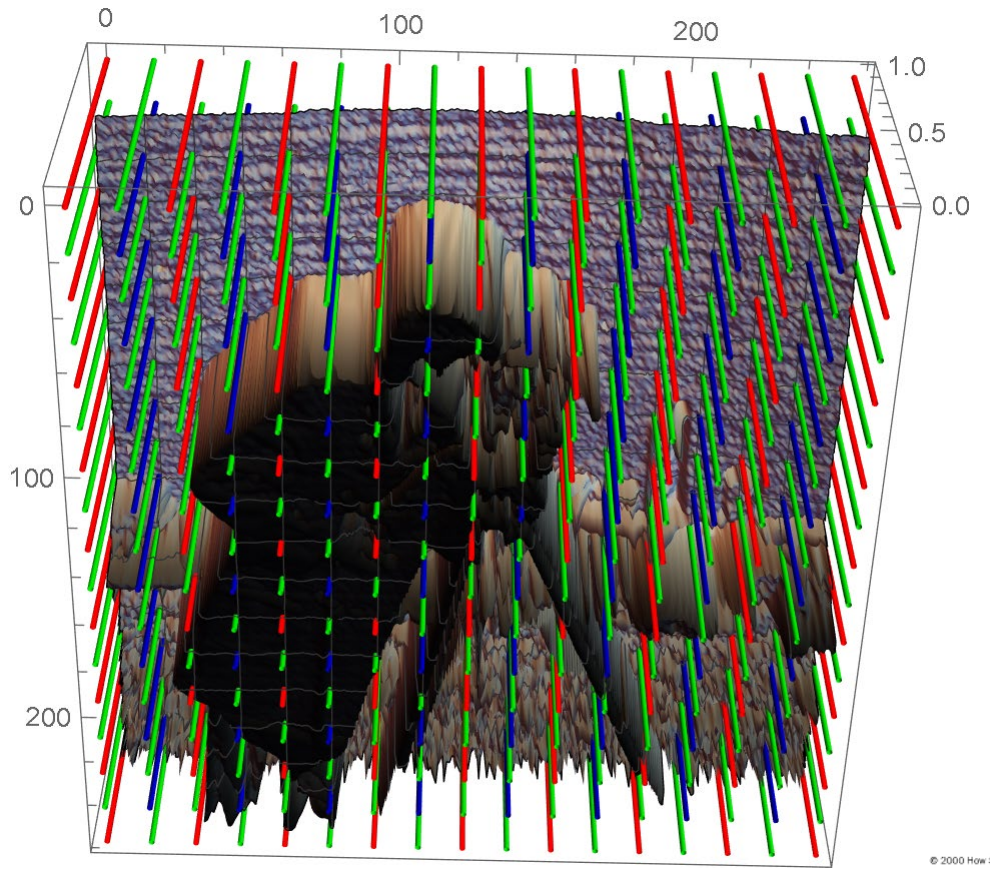
# Image Sampling

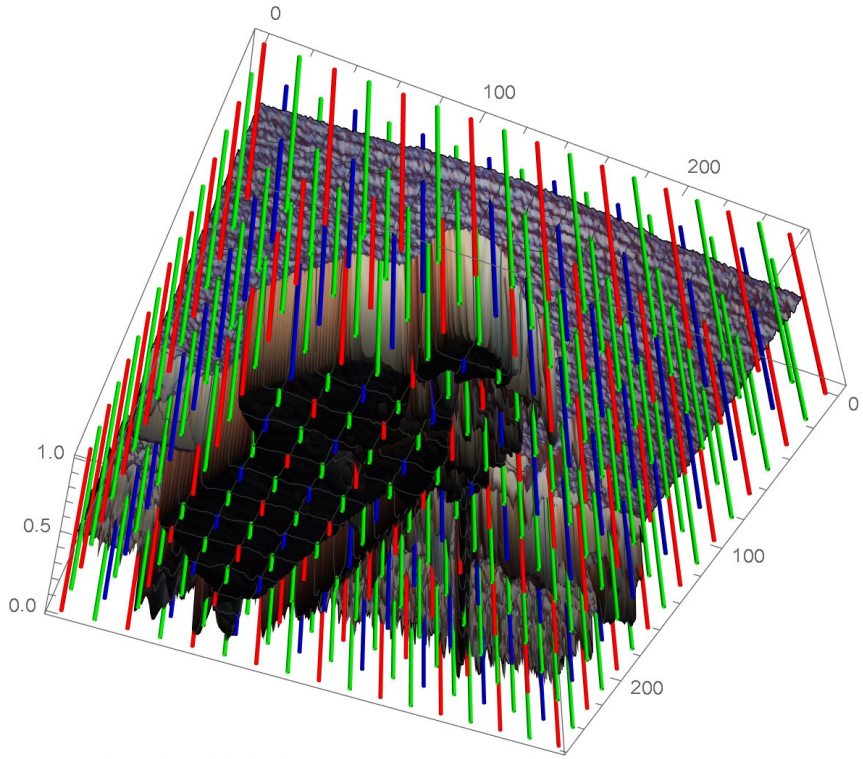


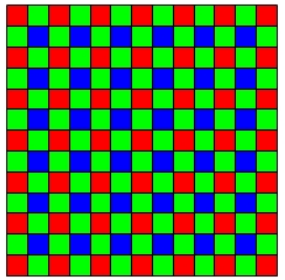




A simple model for a camera sensor is just a 2D array of delta functions (i.e. $comb\left(\frac{x}{d},\frac{y}{d}\right)$). Each delta function in the comb just picks out the value of $i(x,y)$ at its respective location. Resolution is increased by reducing the distance between the delta functions.

# Color Image Sampling



Bayer filter

Color images are sampled with 3 different combs for the red, green and blue channels. The filter over the sensor is called a Bayer filter.