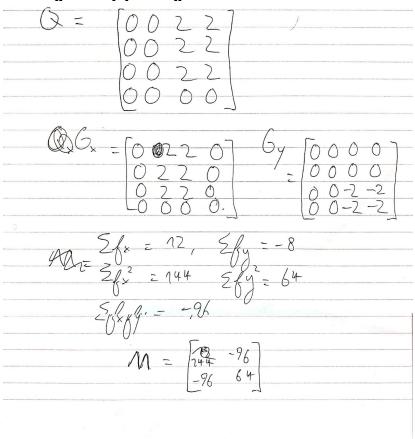
## PART 2

a) We can approximate a higher order derivative of h = [-1, 1] by convolving multiple instances of h over itself

$$[-1, 1] conv [1, -1] = [1, -2, 1]$$

- b) ?
- c) g corresponds to a lowpass filter, h corresponds to a band-pass filter, and g x h corresponds to a band-pass filter. G works as a blurring filter. G x h amplifies high-frequency differences.
- d) This yields a 4x4 matrix where all entries are zero.
- e) Blobs / points
- f) It can be separated into two instances of k = [1, -2, 1], where k \* k.T = U
- g) First we need to compute Gx and Gy for image patch Q. I used a kernel of [-1, 0, 1] because its equivalent and easier to work with.

I.e. 
$$M = [[144 - 96], [-96, 64]]$$



- h) If both eigenvalues are small, then the area is likely homogeneous. If both are large then the area like is a corner. If one of the eigenvalues is much larger than the other, then this indicates an edge.
- i) To do this we need to compute the gradient orientations and then construct a histogram over all the orientations. Gradient orientation = arctan (Gy/Gx)

Gradient. Occupation = ten (14)	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\frac{\text{courter}(\frac{0}{2})}{\text{arctin}(\frac{-2}{2})}$ = $\frac{\text{courter}(\frac{-2}{2})}{\text{courter}(\frac{-2}{2})}$ =	:
curta (0) = - cuf wroten () = inf	
Flistogram Sim = 123 4-56789  Constier rug	
CS Scanned with CamScanner	

Unfortunately I didnt have enough time to compute the gradient orientations + magnitudes, but if i HAD, i would have constructed the histogram by taking the number of recorded angles and recording those in the histogram

- j) SIFT is invariant to scaling, rotation and lightning,
- k) We could attempt to compute the optical flow as the the patches are not uniform, though the resulting flow estimate would be crude.