Quiz 3: CS4640   Name _____
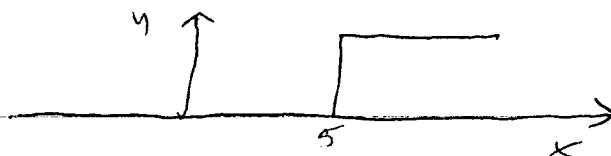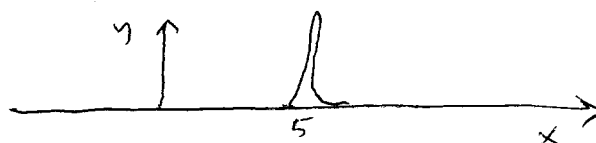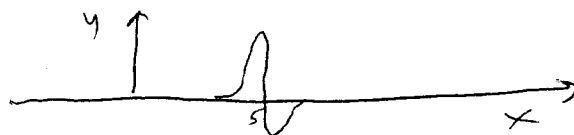
1a. Graph a 1-D step edge function (step from 0 to 1 at x=5).

b. Graph the derivative of the 1-D step edge from 1a.
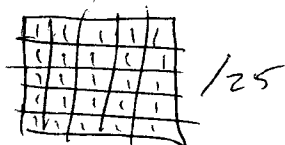

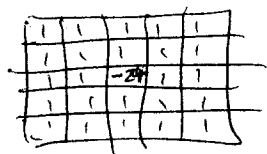c. Graph the second derivative of the 1-D step edge from 1a.

2. Give a 5x5 spatial filter which will accomplish the stated operation.

a. Lowpass   any averaging filter

   /25

b. Highpass   any differential filter

c. Median

does not exist

3a. State the computational complexity (Big O notation) of the convolution of an MxM filter with an NxN image; explain why this is the complexity.

$$O(M^2 N^2)$$ since at every image pixel (there are N^2) we multiply M^2 times

b. How many multiply and addition operations are needed to convolve a 3x3 filter with a 5x5 image? Explain.

At each of 25 locations, place center of filter there:

9 multiplies
8 additions

$\Rightarrow$ 9·25 multiplications   225
      8·25 additions   200