Homework 5

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(Tested on xbank.jpg)

1.a The kernel size should be at least three times the size of the main lobe. The main lobe size is approximately equal to sigma (standard deviation). Since the kernel is two dimensional and symmetric, the kernel size should be 2\*sigma +1 (odd number so that coordinates are integer).

1.b The larger the kernel (larger sigma), the more noise-robust. Filter with kernel sigma =2 shows the best result and the false edge by noise is reduced as well.

1.c The slope magnitude is calculated using diff() function in matlab. Thresholds are chosen according to the slope magnitudes (absolute value of diff() ) percentiles. 60%, 70%, 80% and 90% percentiles are tested for each kernel. For kernel with sigma=1, the best threshold is around 55. For sigma = 1.5 the best threshold is around 31. For sigma = 2, the best threshold is around 18. We can see that the best thresholds are different for different kernels. This is because LoG is equivalent to apply an Gaussian Operator (low pass filter) to the original image and then calculate the second derivatives of the filtered image. With a larger the kernel, the noise is better eliminated.