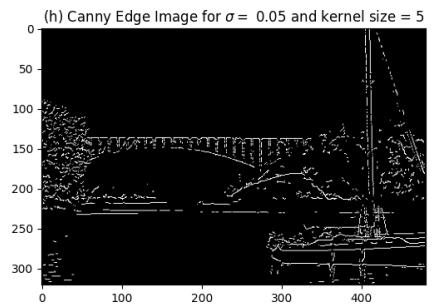
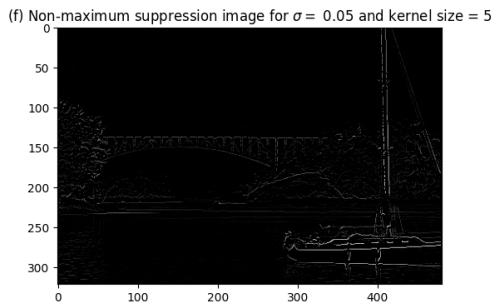
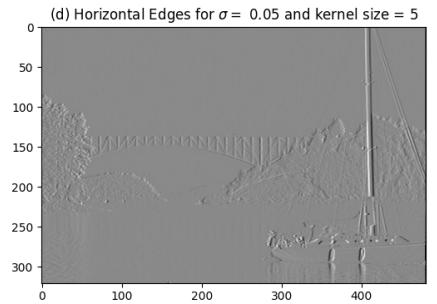
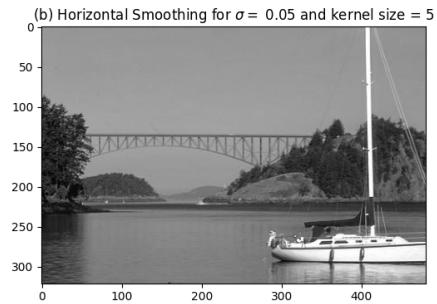
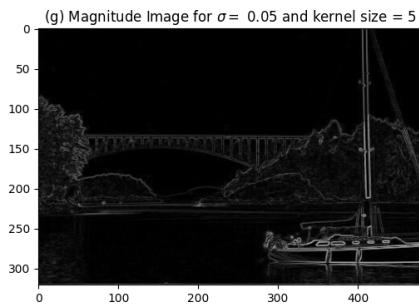
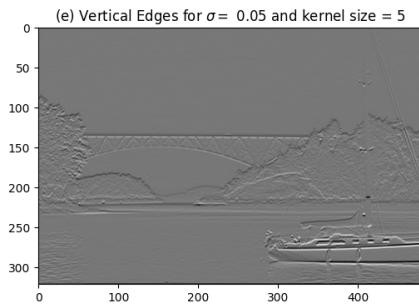
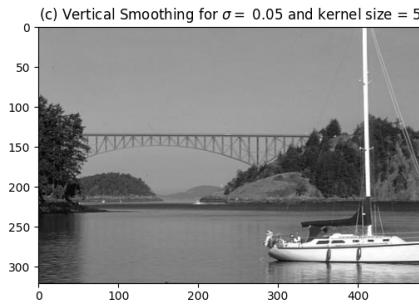
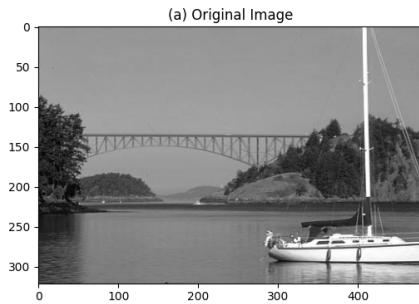
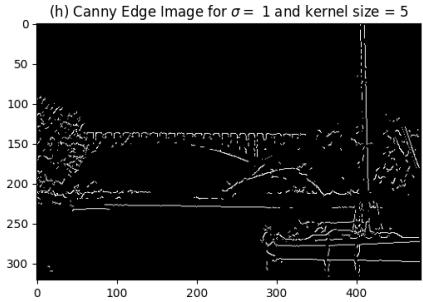
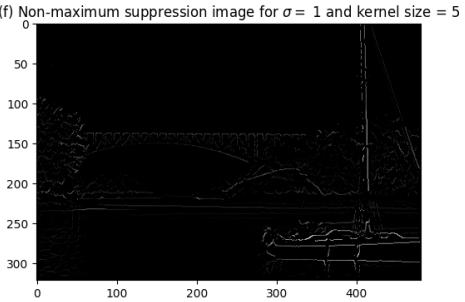
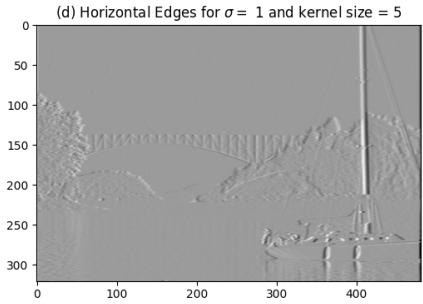
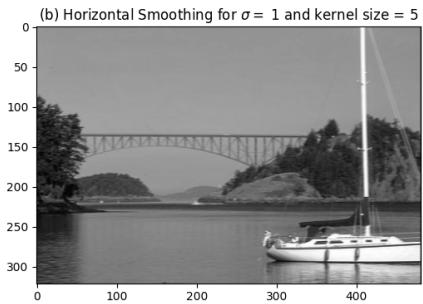
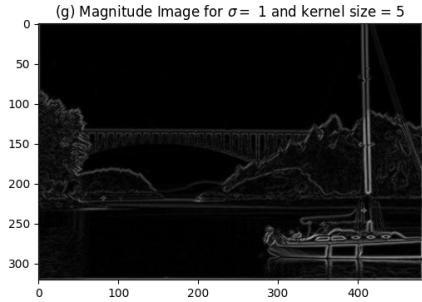
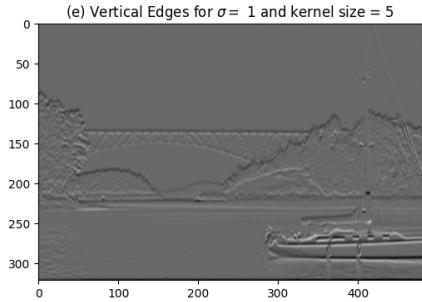
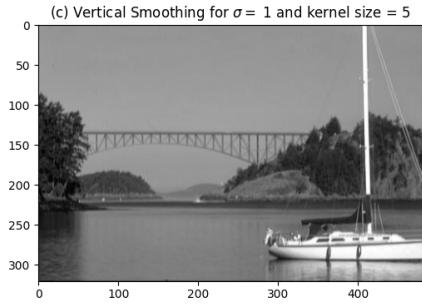
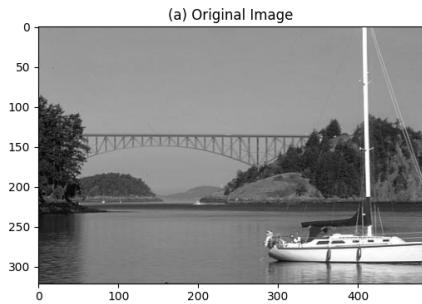


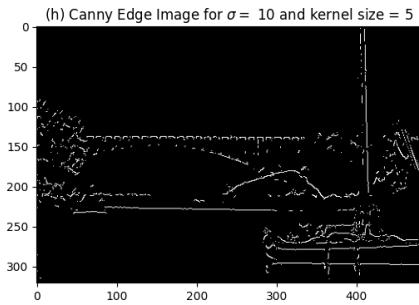
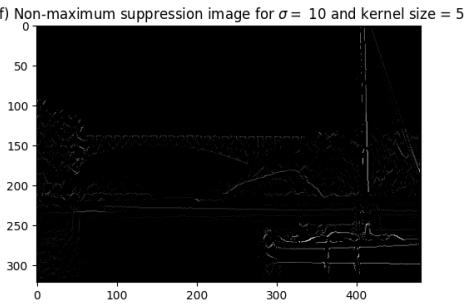
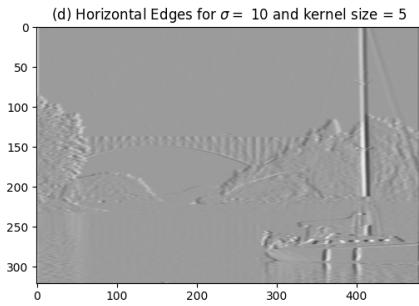
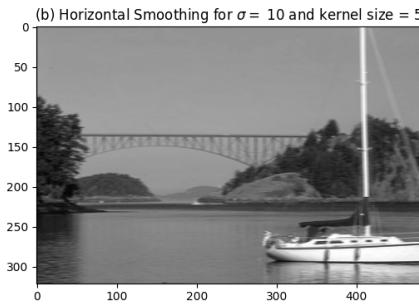
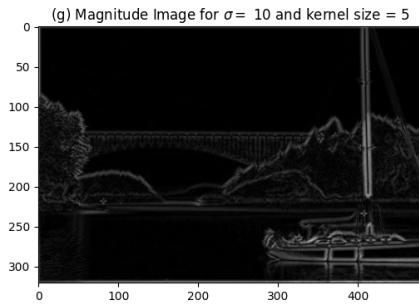
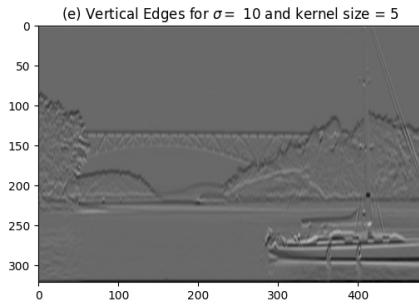
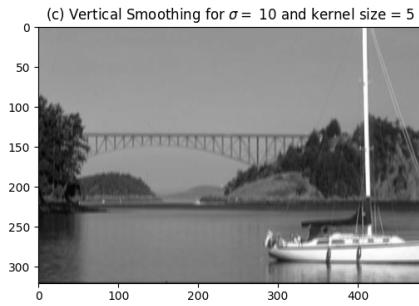
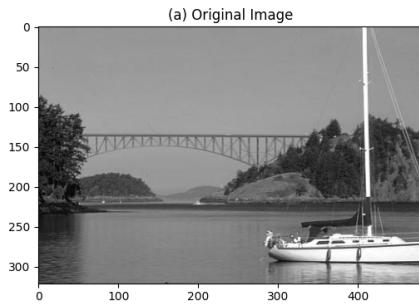
# **Programming Assignment 1**

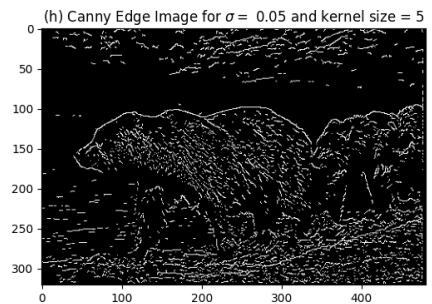
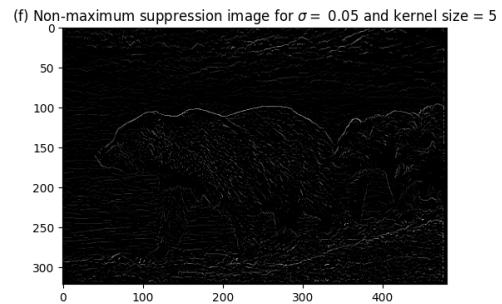
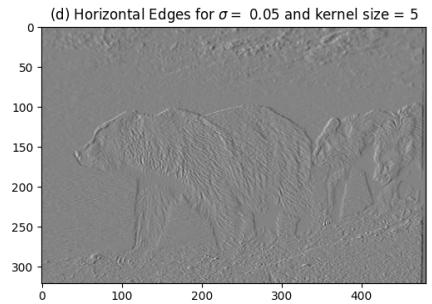
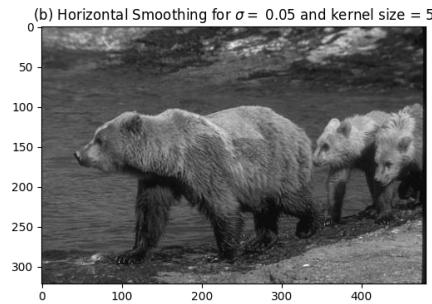
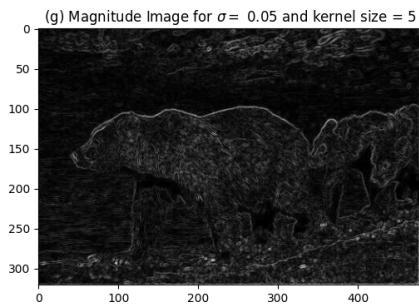
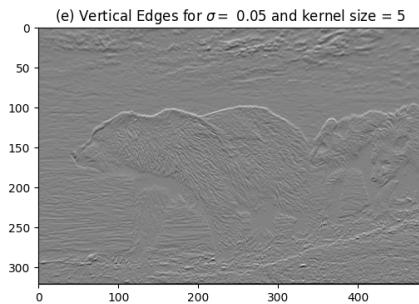
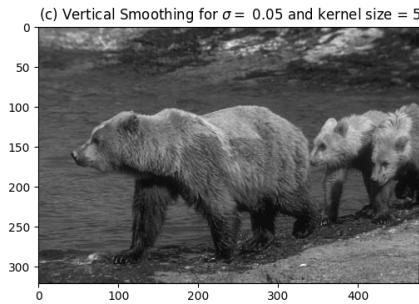
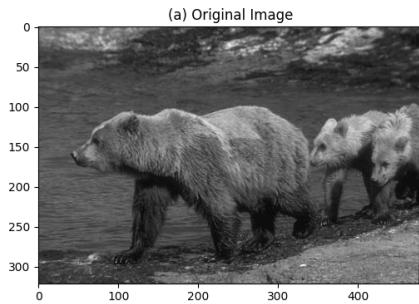
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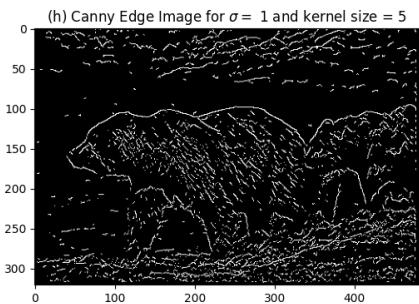
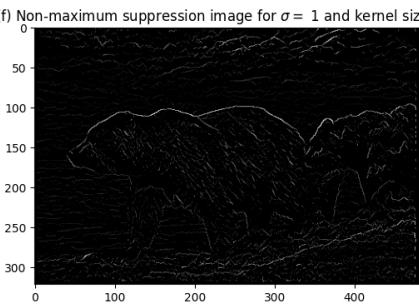
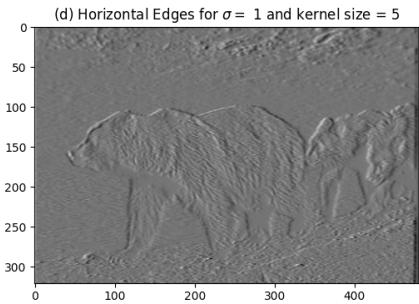
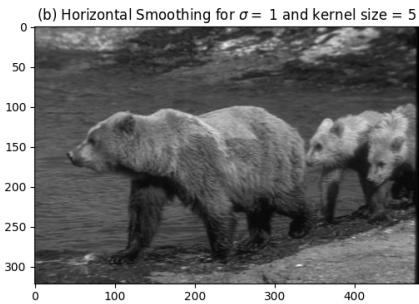
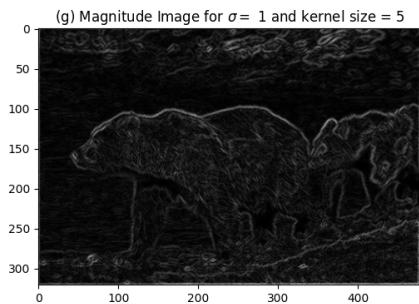
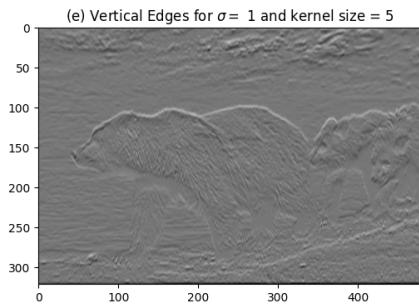
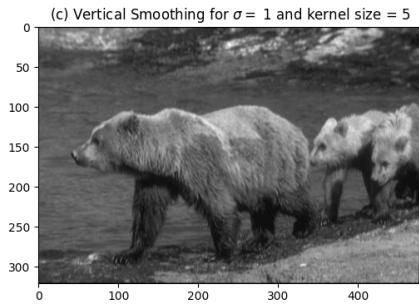
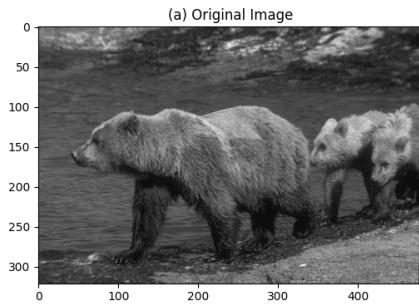
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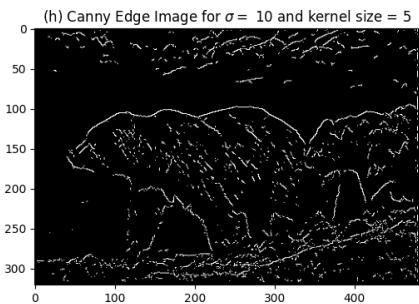
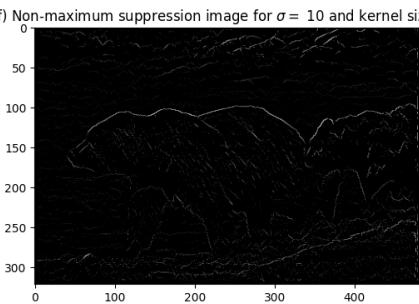
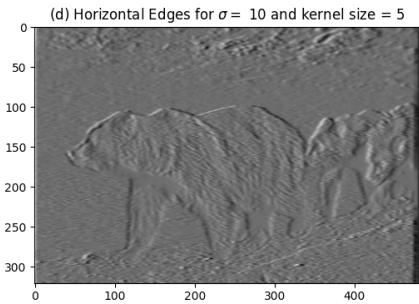
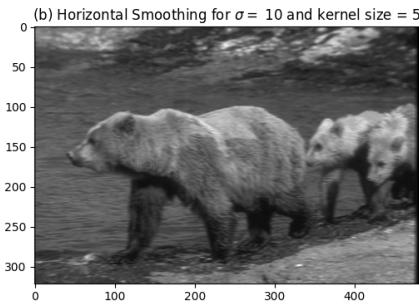
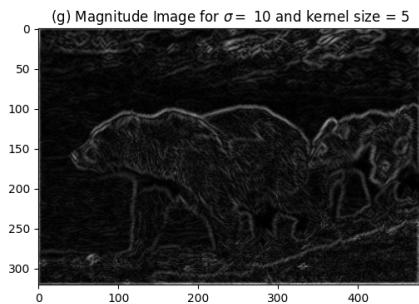
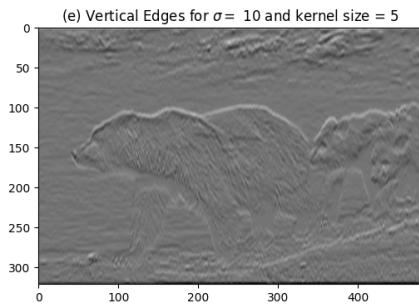
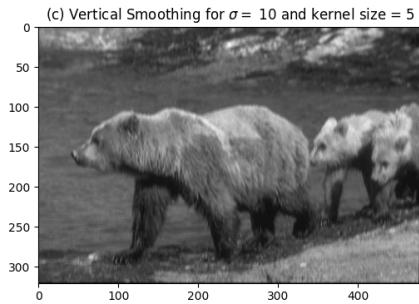
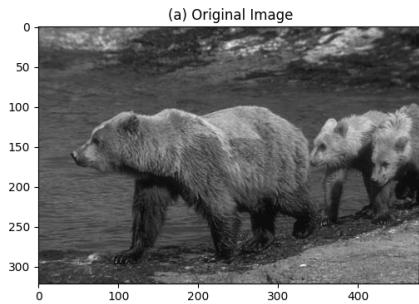


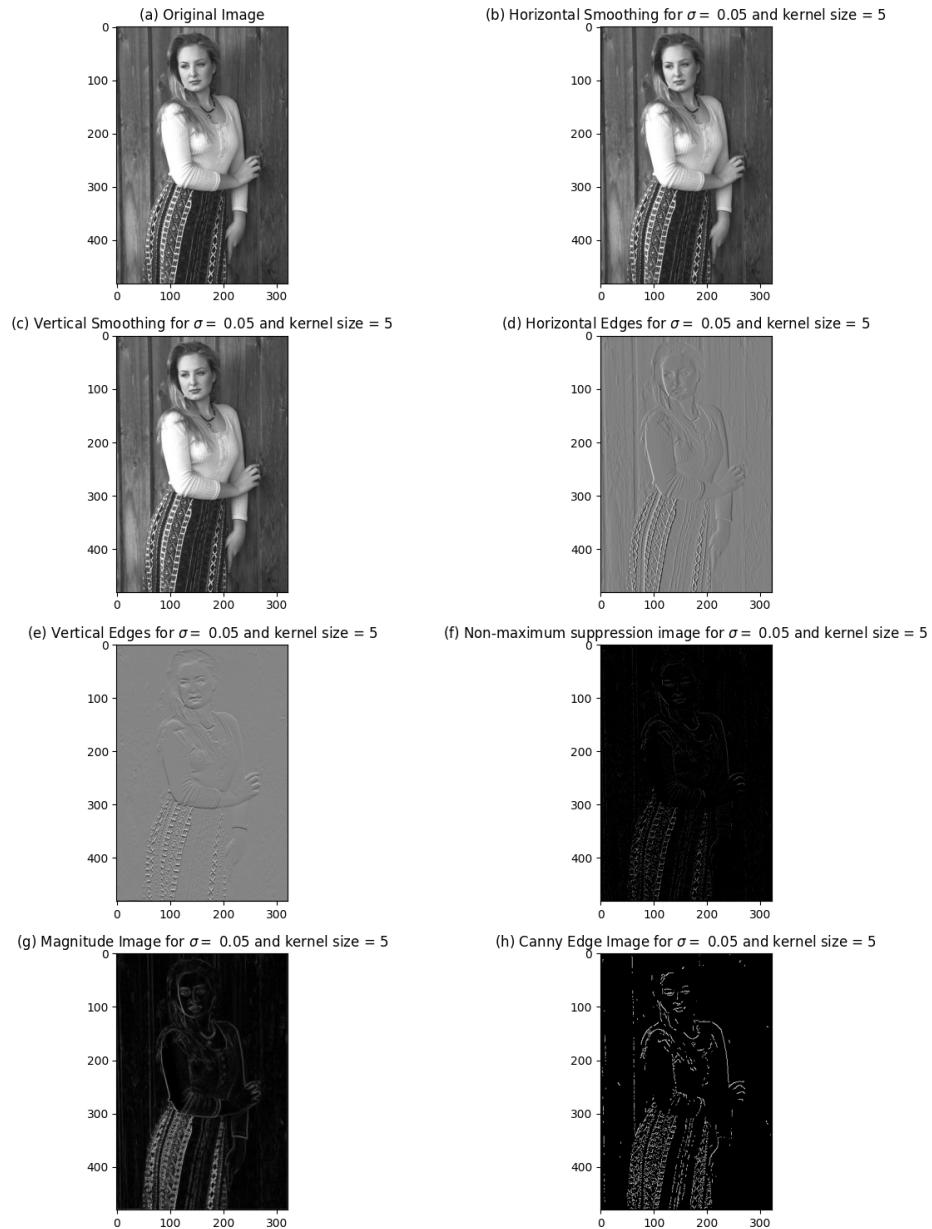


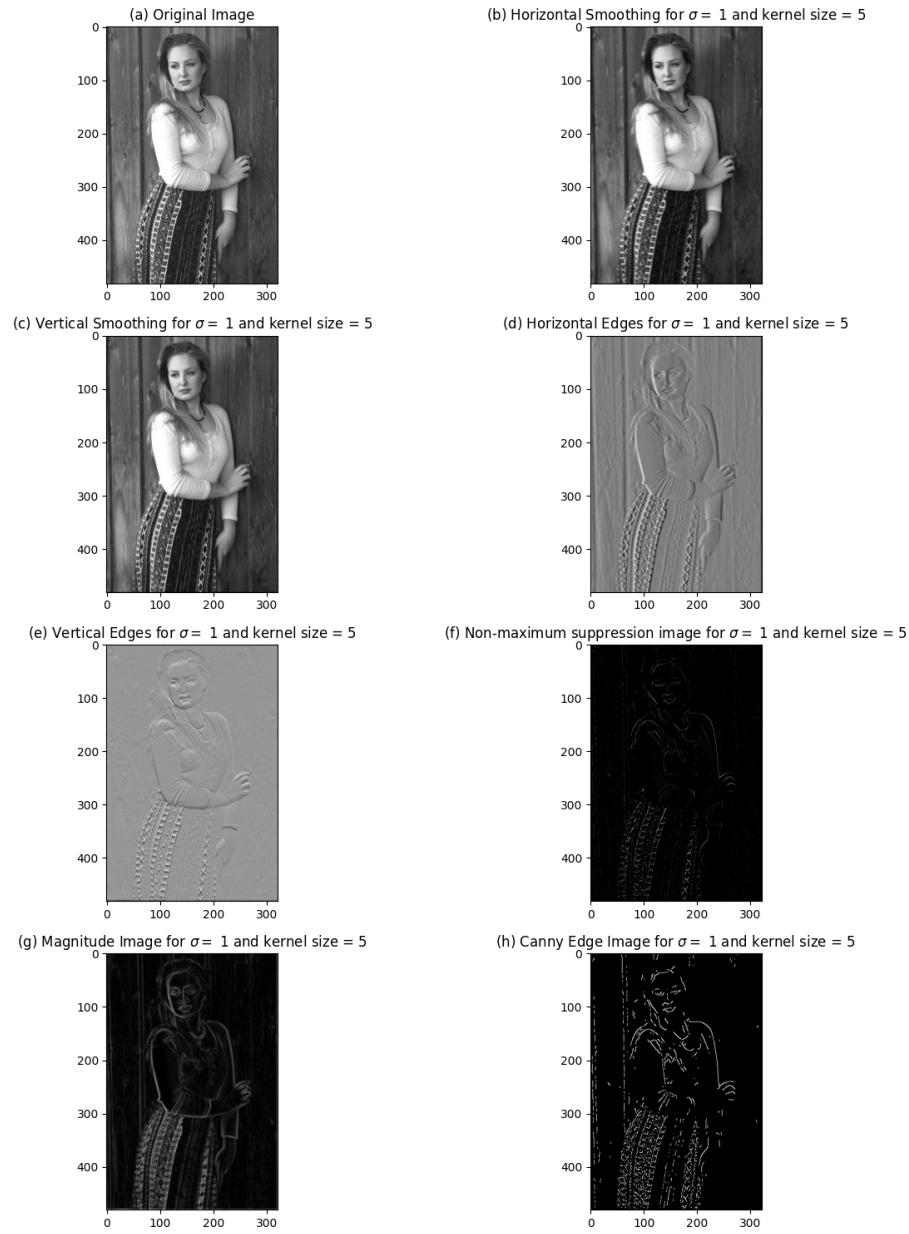




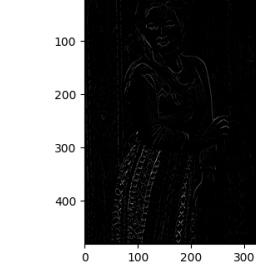




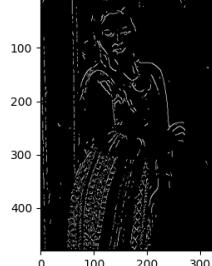




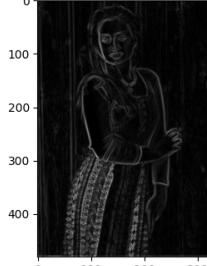
(e) Vertical Edges for  $\sigma = 1$  and kernel size = 5



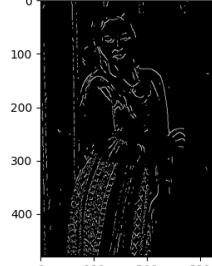
(f) Non-maximum suppression image for  $\sigma = 1$  and kernel size = 5

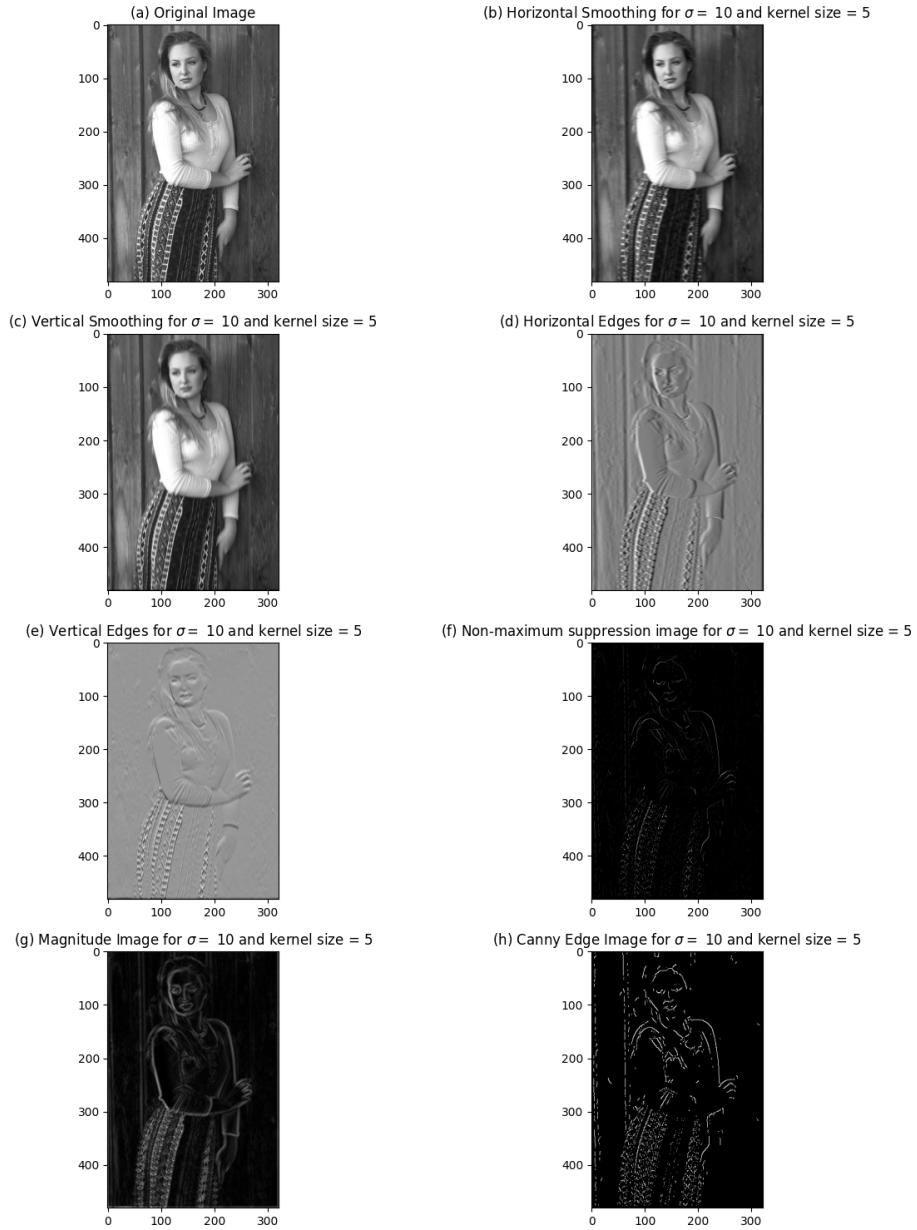


(g) Magnitude Image for  $\sigma = 1$  and kernel size = 5



(h) Canny Edge Image for  $\sigma = 1$  and kernel size = 5





In this programming assignment, I implemented Canny edge detection from scratch in several steps, like smoothing to reduce noise using a gaussian kernel, then convolving the image using a derivative of the gaussian kernel, non-max suppression to keep true edge pixels for edges, and finally, using hysteresis thresholding, achieving the canny edges of the image. Though I didn't get extremely good results, I explored the algorithm for various tuning parameters like kernel size and sigma value. In this report, I have attached various intermediate results in the form of images here for kernel sizes of 5 and three sigma values of 0.05, 1, and 10. As the sigma value is increasing, I notice that I found more straight line edges by reducing the unwanted details edge of the object.