Answer ONLY 2 of the following 3 questions.

Make sure you indicate by number which 2 questions you're answering (e.g. 31-A, 31-B or 31-C).

Q31-A / Edge Detection

[1 marks] **a)** Which of the Gradient or the Laplacian is the preferred sharpening filter for edge detection, and why ?

[2 mark] **b)** Describe the goal of hysteresis thresholding in Canny edge detection, and how it works.

[1 mark] **c)** List the main steps of the Canny edge detection method.

[1 mark] **d)** List the main steps of General edge detection (as in Prelab 3).

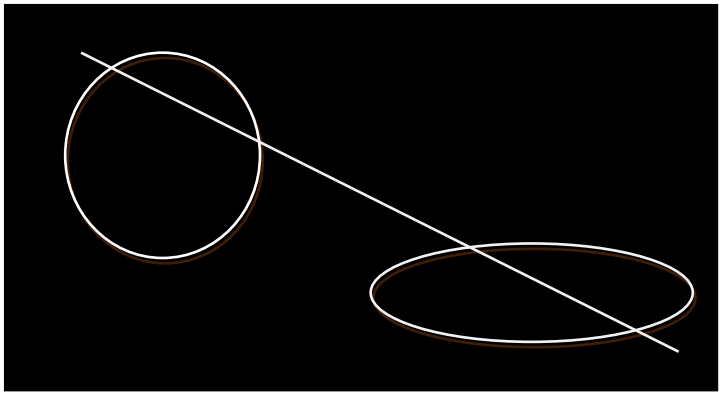
Q31-B / Segmentation

[2 marks] **a)** List the main steps of k-means clustering for color quantization.

[1 marks] **b)** Describe two ways to choose the value of k in the k-means clustering algorithm.

[2 marks] **c)** List the main steps of region growing segmentation.

Q31-C / Geometric Primitive Extraction



[2 marks] **a)** Describe the main algorithmic steps of RANSAC for detecting lines in an edge image. Assume that the image is binary, i.e. pixel value 0 indicates a non-edge, and pixel value 255 indicates an edge.

[1 mark] **b)** In the above image, assume that there are 10,000 edge pixels, and that 1,000 of them fall on the line. What is the probability that the line is detected in any given iteration of RANSAC? Explain your reasoning.

[2 mark] **c)** Describe the main algorithmic steps of the Hough transform for detecting lines in an image. As above, assume that the image is binary, i.e. pixel value 0 indicates a non-edge, and pixel value 255 indicates an edge.