

**Multiple Part True/False Questions.** For each question, indicate which of the statements, (A)–(D), are **true** and which are **false**? Note: Questions may have zero, one or multiple statements that are true.

**Question 1** There are advantages to using a hash table rather than an accumulator array to store votes in a Hough transform. Which of the following statements are **true** and which are **false**?

- (A) It is faster to enter each vote into a hash table.
- (B) There are more votes in each bin when the fitted model is present.
- (C) Less storage is required since empty bins in a hash table are not represented explicitly.
- (D) It is not necessary to predict the maximum range of each parameter in advance in order to determine the array size.

**Question 2** Both the Hough transform and RANSAC are techniques for fitting data to a model. Which of the following statements are **true**? Which are **false**?

- (A) RANSAC performs better than the Hough transform as the number of parameters in the model increases.
- (B) The Hough transform performs better than RANSAC as the number of outliers increases significantly over 50%.
- (C) Performance of the Hough transform improves when the points used to fit to the model are more distinctive.
- (D) For a particular data set, RANSAC finds, at most, one instance of the model. On the other hand, the Hough transform can find more than one instance, if multiple instances exist.

### **Short Answer Questions.**

**Question 3** The title of the Efros and Leung paper that formed the basis for Assignment 4 is, “Texture synthesis by non-parametric sampling.”

- (a) In the context of CPSC 425, what does the term non-parametric mean?
- (b) In the context of the Efros and Leung paper, is the use of the term non-parametric in the title appropriate? (Briefly justify your answer).

**Question 4** Suppose we want to fit a circle to a set of points using RANSAC. Assume that 75% (i.e.,  $3/4$ ) of the points are outliers. How many random samples of 3 points are needed to detect the circle with 95% probability? (Note: In an exam setting, you wouldn't need to compute an actual number, but just show how it would be computed if you had a scientific calculator available).