

Name:

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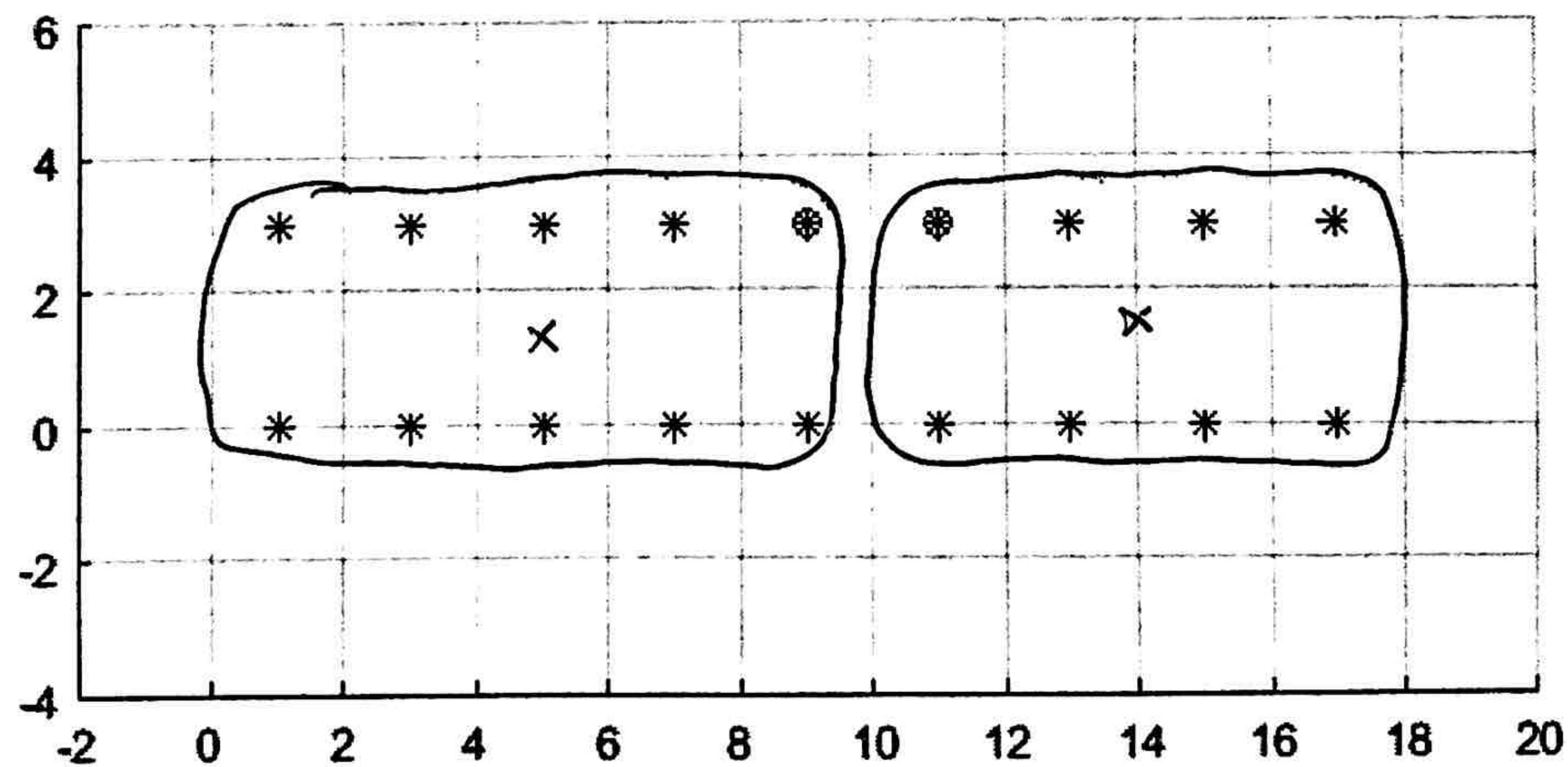
ECE398BD - Quiz 3

February 10, 2016

Time: 20 minutes

### Problem 1 *K*-Means Clustering [10 points]

Apply *K*-means clustering to the points shown below. Use the circled points (9, 3) and (11, 3) as your initial cluster centers. Clearly mark what your final clusters are and their centers.



$$\text{center 1} = (5, 1.5)$$

$$\text{center 2} = (14, 1.5)$$



## Problem 2 Concepts [20 points]

Answer each with one to two complete sentences. Each part is worth 5 points.  
Print your answers.

1. What is the difference between regression and classification?
2. Give one reason to do model selection for linear regression.
3. Describe one application of K-means clustering.
4. Explain the intuition behind the elbow (also known as the knee or kink) method.

1. regression  $(x, y)$   
features response.  
response is continuous.

classification  $(x, y)$   
features labels.  
labels are discrete.

2. Avoid overfitting bias-variance trade-off.

3. Vector quantization. Image segmentation.  
Section 4.2 in notes.

4.  $J^*(K)$  is decreasing as  $K \uparrow$ .

If  $K$  is correct, breaking the cluster down further should not change  $J^*(K)$  much, since the members of the cluster are already similar.

See Section 4.1.