Name: 
ComputingID: 

• This is a closed book and closed notes quiz. No electronic aids or cheat sheets are allowed.

• There are 2 pages, 3 parts of questions, and 20 total points in this quiz.

• The questions are printed on the back of this paper!

• Please carefully read the instructions and questions before you answer them.

• Please pay special attention on your handwriting; if the answers are not recognizable by the instructor, the grading might be inaccurate (NO argument about this after the grading is done).

• Try to keep your answers as concise as possible; grading is not by keyword matching.
1 True/False Questions (3pts×2)

For the statement you believe it is False, please give your brief explanation of it (you do not need to explain anything when you believe it is True). Note the credit can only be granted if your explanation is correct.

1. Based on the Bayes decision theory, Naive Bayes classifier is optimal.  
   \textbf{False}, and Explain: conditional independence breaks its optimality.

2. Logistic regression aims at maximizing its prediction entropy.  
   \textbf{False}, and Explain: it maximizes entropy of the model parameter distribution, rather than the predicted labels.

2 Multi-choice Questions (4pts×2)

1. Which of the following statement(s) is true about the kNN classifier: (b), (c), (d)  
   (a) it assumes instances are uniformly distributed in space;  
   (b) it does not have a training phase;  
   (c) increasing the number of neighbors would help reduce the risk of overfitting;  
   (d) it assumes similar instances tend to have similar class labels.

2. Which of the following statement(s) is true about the SVM classifier: (a), (b)  
   (a) The decision hyperplane is determined by a linear combination of support vectors;  
   (b) Non-linear classification can be achieved via a kernel trick;  
   (c) It encourages a sparse model;  
   (d) It minimizes 0/1 loss.

3 Short Questions (6 pts)

1. Name a generative classifier and a discriminative classifier, and specify at least two major differences between these two types of classification methods.
   \textbf{Generative classifier: Naive Bayes, discriminative classifier: SVM. Several major differences: 1. generative classifiers model joint probability, while discriminative classifiers model conditional probability; 2. arbitrary features can be incorporated in discriminative classifiers, but not in generative classifiers; 3. unlabeled data can be easily incorporated in generative classifiers, but not in discriminative classifiers.}