Name:

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| --- | --- | --- |
| Problem | Points | Score |
| 1(a) | 30 |  |
| 1(b) | 20 |  |
| 2(a) | 10 |  |
| 2(b) | 20 |  |
| 2(c) | 10 |  |
| 2(d) | 10 |  |
| Total | 100 |  |

Notes:

1. The exam is closed books and notes except for one double-sided sheet of notes.
2. Please indicate clearly your answer to the problem.
3. If I can’t read or follow your solution, it is wrong and no partial credit will be awarded.

**Problem No. 1**: Consider two probability distributions defined by:

 and 

and assume equal priors.

(a) Draw two points at random from each class. Design a neares-neighbor classifier based on these points. Compute the probability of error.

(b) Explain what happens as you allow the number of points drawn to increase. Show that your result in (a) converges to the correct result.

**Problem No. 2**: Consider the following models for a system that outputs sequences of the characters “$” and “%”. For these models, you must start in state 1 and end in state 2.

1. Compute the probability that model A produced the sequence “%$%”.



1. Which model most likely produced the sequence “%$%”. Explain.
2. Which state sequence most likely produced the sequence “%$%”. What was the probability of that state sequence?
3. Give at least two reasons why the probabilities in (a) and (c) differ.