Quiz 6 CSE 255, Spring 2017

Name: _____

PID: _____

This is the sixth quiz of CSE255/DSE230

On your desk you should have only the exam paper and writing tools. No hats or hoods allowed (unless religious items). There is one question in this quiz.

You have 10 minutes to complete the exam.

Start by writing your name and PID on this page.

Good Luck!

Problem I (50 points)

Algorithms for learning Decision trees use a "purity measure" $f(p)$ which is a function from $[0, 1]$ to $[0, 1]$, the next split is the one which minimizes the average of $f(p)$. A good purity measure is one that guarantees progress of the tree learning algorithm as long as at least one of the leaves is not pure (all of the labels are +1 or all of the labels are -1)

Mark all of the correct statements

1. The minima of a purity measure must be at $p = 0$ and $p = 1$
2. The maximum of a purity measure must be at $p = 1/2$.
3. The function $f(p) = \min(p, 1 - p)$ is a good purity measure.
4. The function $f(p) = p(1 - p)$ is a good purity measure.
5. A good purity measure must be strictly concave.

Problem II (50 points)

The following statements are about the Adaboost algorithm for binary classification. Mark all of the correct statements.

1. Adaboost reduces the training error of the combined rule on each iteration.
2. A weak rule is one which is slightly better than random guessing with respect the the uniform distribution over the training examples.
3. A weak rule whose error rate is 60% is better than a weak rule whose error rate is 45%.
4. If the errors of the weak rules are all smaller than 48%, Adaboost will generate a strong rule whose training error is zero.
5. Performing classification using an alternating decision tree requires summing the prediction nodes along a path from the root to a leaf.