Homework 6

Problem

Bar Brawl

Note: More information forthcoming.

You are the proprietor of an establishment that sells beverages of an unspecified (but delicious) nature. The establishment is frequented by a set P of patrons, one of whom is the *instigator* and another of whom is the *peacemaker*.

On a given evening, a subset $S \subseteq P$ is present at the establishment. If the instigator is in S but not the peacemaker, then a fight will break out. If the instigator is not in S *or* if the peacemaker is in S, then no fight will occur.

You want to predict whether a fight will break out among a subset of the patrons, initially without knowing the identities of the instigator and the peacemaker.

Write a Java class called **BarBrawl** to implement a KWIK learner for this problem. The constructor for this class should take the following argument:

- An int $numPatrons$, which gives the cardinality of the set of all patrons P. $numPatrons$ will satisfy $2 \leq numPatrons \leq 1000$.

The class should have the following public functions:

- **predictOutcome**, which takes as its argument a $boolean[]\ atEstablishment$ of length $numPatrons$ such that $atEstablishment[i]$ tells whether patron i is present at the establishment. The function should output one of three Strings:
  - "FIGHT"
  - “NO FIGHT"
  - “I DON'T KNOW"
- **learnObservation**, which takes as its arguments a $boolean[]\ atEstablishment$ and a $boolean fightOccurred$ and returns nothing. $atEstablishment$ has the same interpretation as in $predictOutput$. $fightOccurred$ says whether a fight occurred when the

subset of patrons represented by $atEstablishment$ was at the establishment.

If "FIGHT" or "NO FIGHT" is returned by $predictOutcome$, then the answer must be correct. If not, then the test case will be considered failed.

If "I DON'T KNOW" is returned by $predictOutcome$ for a given input $atEstablishment$, then $learnObservation$ will be called with the same value of $atEstablishment$ and the correct output for $predictOutput$ as the value of $fightOccurred$.

A test case will consist of several queries of $predictOutcome$ for a particular set of patrons P. The test case will be considered successful if no wrong answers are returned and "I DON'T KNOW" is returned no more than $numPatrons * (numPatrons - 1) - 1$ times.

When you are ready to submit your code, submit your code as a single file, **BarBrawl.java**. If you find an error in your code prior to the submission deadline, you may resubmit your code using the same procedure. We will grade only your most recent submission. If you do not submit anything prior to the deadline, you will receive 0 points for this assignment.