

# [ML] Malicious Data

Problem ID: malicious

You're a spy and as part of your mission, you need to sabotage a machine learning model to make it less accurate. You've gotten access to the training data, but only can add a small number of rows to it in order to avoid detection. The existing training data consists of  $k$  feature rows of  $d$  features, each with a corresponding binary label. You may add  $m$  additional feature/label pairs to the training data, with the goal of making the resulting model as inaccurate as possible.

You can download the script we'll be using to train the model in the attachments of this problem, as well as the training data. For this problem, you only need to submit the output as a `txt` file, not the code used to generate the output.

## Input

The first line consists of three space separated integers,  $k$ ,  $d$ , and  $m$ . The next  $k$  lines consist of  $d$  space separated floating point feature values. The final  $k$  lines consist of either 1 or 0, representing the labels.

## Output

Your program should write to a `txt` file which you should then upload.

Write  $2m$  lines. The first  $m$  lines should each contain  $d$  space separated floating point numbers representing the features for added data points. The next  $m$  lines should contain 1 or 0, representing the labels for the newly added data points.

## Scoring

Scoring for this problem will be based on the change in (hidden) test data ROC-AUC of a gradient boosted decision tree trained on the training data before and after your additions to the training data. In particular, score is defined as:

$$100 \times \min(1, (AUC_{\text{before}} - AUC_{\text{after}}) \times 10)$$

so a 0.1 change in AUC will result in full points, where AUC is a float in  $[0,1]$  as returned by `sklearn.metrics.roc_auc_score`. Scores are rounded to the nearest integer.

### Sample Input 1

```
10 5 3
0 3 2 0 7
5 9 0 2 7
2 9 2 3 3
2 3 4 1 2
9 1 4 6 8
2 3 0 0 6
0 6 3 3 8
8 8 2 3 2
0 8 8 3 8
2 8 4 3 0
1
1
1
1
0
1
0
1
0
0
```

### Sample Output 1

```
3 0 0 2 0
1 2 1 1 1
1 1 1 1 1
0
0
1
```