Polytechnic Tutoring Center

Midterm 2 REVIEW – CS1133, Spring 2020

Disclaimer: This mock exam is only for practice. It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.

Question 1

For any given matrix, replace any even numbers with the negative of the value (ex: if the value is 8, it should be replaced by -8), and replace any positive odd numbers with 3 times the square root of the value. Do not alter negative odd numbers.

An example is shown below, with the given matrix on top and the matrix after completing the desired operations on the bottom.

Initial Matrix:

```
-40    79    31    53     5    -9
 64    36   -72    53    78    54
-74     2   -67    38    26   -65
  0    -3     5   -54    50   -57
-51   -69   -63    28    -5   -51
```

Matrix After Completing Operations:

```
  40    26.6646    16.7033    21.8403     6.7082     -9
 -64        -36         72    21.8403        -78    -54
  74         -2        -67        -38        -26    -65
   0         -3     6.7082         54        -50    -57
 -51        -69        -63        -28         -5    -51
```

You should also count how many even numbers are in the matrix, as well as how many odd numbers are in the matrix. The example above contains 14 even numbers and 16 odd numbers. You may assume that the matrix contains only whole numbers. Your code should work for a matrix of any size. You may NOT use vectorized operations. There is no need to produce an output display.

Question 2

A basketball player shoots free throws in order to improve their shooting form. If the player misses a shot three consecutive times, they stop shooting out of frustration. The player has a 60% chance of making any given shot.

Create a Monte Carlo simulation of the situation to determine the chance that the person will take 10 or more shots before giving up. You should also determine the average number of shots taken across trials. You may NOT use vectorized operations.

Your program should produce the following output display.

```
The player took an average of 9.8 shots.
The probability that the player will stop will take more than 10
shots before stopping is 0.7.
```

Question 3

You play a game in which you randomly draw from a deck of cards and place the cards in a pile. You continue to do this until the sum of the cards in the pile meets or exceeds 283, or until you have four consecutive cards which appear in ascending order (ex: 7, 8, 9, 10).

Assume you are using a standard deck of 52 cards. The face cards ace, jack, queen, and king have values of 1, 11, 12, and 13, respectively. Thus, the values of cards in the deck range from 1 to 13, and each number appears on four cards in the deck.

The output display should depend on the conditions under which the game ended.

If the game ended because a sum of 283 or greater was reached, the output display should resemble the following.

```
The game is over, the sum of the cards in the pile was 287.
You played 39 cards.
```

If the game ended because 4 ascending cards were played, the output display should resemble the following.

```
The game is over, you played 4 ascending cards in a row.
You played 6 cards.
```