

Name _____ Period _____

A two-dimensional square array of integers is a Latin square if the following conditions are true,

- The first row has no duplicate values
- All values in the first row of the square appear in each row of the square
- All values in the first row of the square appear in each column of the square

Examples of Latin Squares

1	2	3
2	3	1
3	1	2

10	30	20	0
0	20	30	10
30	0	10	20
20	10	0	30

Examples that are NOT Latin Squares

1	2	1
2	1	1
1	1	2

Not a Latin square
because the first row
contains duplicate
values

1	2	3
3	1	2
7	8	9

Not a Latin square
because the elements of
the first row do not all
appear in the third row

1	2
1	2

Not a Latin square
because the elements of
the first row do not all
appear in either column

The algorithms below are intended to populate the first row of numbers with random numbers which range from 0 to the length of the array. The algorithms must also ensure there are not duplicates. However, they do not work as intended. For algorithm, indicate why it fails.

Algorithm 1

```
1: public int[] makeFirstRowTeamDarin(){
2:     int arr[] = new int[arr2D[0].length];
3:     int j = 0;
4:     for(int i = 0; i < arr2D.length; i++){
5:         int temp = (int)(Math.random()*arr2D[0].length);
6:         boolean found = true;
7:         j = 0;
8:         while(found){
9:
10:             if(temp == arr[j]){
11:                 temp = (int)(Math.random()*arr2D[0].length);
12:             }else{
13:                 arr[i] = temp;
14:                 found = false;
15:             }
16:             if(j > arr.length-2){
17:                 found = false;
18:             }else{
19:                 found = true;
20:             }
21:             j++;
22:         }
23:     }
24:     return arr;
25: }
```

Explain why the proposed algorithm fails. In your explanation reference specific lines of code and feel free to circle portions of the code for clarity.

Algorithm 2

```
1: public int[] makeFirstRowTeamThai(){
2:     boolean dupe = true;
3:     int arr[] = new int[arr2D[0].length];
4:     arr[0] = (int)(Math.random()*arr.length);
5:     for(int i = 0; i < arr.length; i++){
6:         if(i > 0){
7:             while(dupe)
8:                 for(int j = 0; j < i; j++){
9:                     if(arr[i] == arr[j]){
10:                        arr[i] = (int)(Math.random()*arr.length);
11:                    }else{
12:                        dupe = false;
13:                    }
14:                }
15:             dupe = true;
16:         }
17:     }
18:     return arr;
19: }
20:
21: }
22: }
```

Explain why the proposed algorithm fails. In your explanation reference specific lines of code and feel free to circle portions of the code for clarity.

Work with your group to Write the makeFirstRow method. Each index in the first row has a unique number. The number should be a random number that ranges from 0 up to the length of the squareDimensions. Write your final algorithm below.

