

ITEC 120: Principles of Computer Science I

Homework 7 – A Basketball Tournament Simulator

>>>>>>> Due Date: Friday, March 16th at 10:00 PM via Desire2Learn <<<<<<<

In doing this homework, remember to abide by the RU Honor Code.

Problem 1

30 points

Basketball mania is upon us. The VBL (Virtual Basketball League) is trying to come up with a basketball tournament program to help drive traffic to their website. They have hired you to write a program that will take a list of teams and their win records, and simulate a single elimination tournament. A single elimination tournament consists of pairs of teams playing a game, then the winners playing other winners, and repeating the process until there is only one team left.

Seeding:

The information about teams is in no particular order, but the team's seed number orders the first round of the tournament. The seed number is determined by the number of wins the team had during the season. The first seed has the highest number of wins, the second seed has the second most number of wins, etc... The team with the highest seed faces the team with the lowest seed, the team with the second highest seed faces the team with the second lowest seed, etc...

For example, take the following four schools and their corresponding wins:

```
SchoolA 10  
SchoolB 11  
SchoolC 3  
SchoolD 6
```

The corresponding seeds would be:

```
Seed #1 - School B  
Seed #2 - School A  
Seed #3 - School D  
Seed #4 - School C
```

Rounds:

Each round must consist of an even number of teams playing. If there are an odd number of teams playing a round, two cases exist. If no team currently has a bye, the team at the beginning of the array gets a bye to the next time there is an odd number of teams in a round. If there is a bye, then the team with the bye plays the team at the first position in the array. At the end of the rounds, your program must check to see if the winner of the rounds should face a team that has a bye.

Your program will randomly decide which one of the two teams playing wins in a particular round.

In order to determine if a number is odd or even, use the following code:

```
int num=3;
if (num % 2 != 0)//Is the remainder of dividing by 2 not 0?
    System.out.println("Odd");
else
    System.out.println("Even");
```

Example:

Given the team description listed below:

```
JHU 1
Georgia 13
Duke 30
VT 29
```

The pairing and results of the rounds would be as follows (dependant on the random number generator):

```
Round 1
Duke versus JHU
    -Duke won
VT versus Georgia
    -VT won
Round 2
Duke versus VT
    -Duke won
Congratulations to the champion Duke
```

Input:

The first number entered into the program will be the number of teams playing in the tournament. Each successive line indicates the team name, and the number of wins they have in a season.

For example:

```
4
JHU 1
Georgia 13
Duke 30
VT 29
```

Testing note: your program must allow for a file to be redirected as input to the program (java programName < fileName.txt). If it does not, then you will receive a 0 on this program. As long as you use one scanner and pass it around as a parameter, this will not be a problem.

Output:

Your program should display the round number, who is playing in the round, and who won each game. Whenever your program awards a bye, you should print out that a particular team has received a bye for that round.

For example:

```
Round 1
Duke versus JHU
    -Duke won
VT versus Georgia
    -VT won
Round 2
Duke versus VT
    -Duke won
Congratulations to the champion Duke
```

Constraints:

You must use at least two functions in your solution. You must also submit a test case that is similar but not identical to the previous usage scenario. By doing so, you demonstrate that you have tested your program beyond the basics.

No fields, instance, or class variables may be used in this program. If you don't know what they are, don't worry about it. The purpose for this rule is to make sure you must pass information through the program with parameters.

The reference solution for this project is 144 lines of code without comments. Feel free to use less or more code in your program.

Submission requirements:

You must submit the .java file containing your program to Desire 2 Learn under the Homework #7 assignment. If your submitted file does not compile, it will receive a 0. You can demo the homework the next school day after it is due, or it will be graded automatically. If you choose not to demo your homework you cannot contest the grade you receive.

Grading Rubric

12 Points - Are the correct brackets / rounds displayed ?

8 Points - Does it correctly pair up the teams?

5 Points - Is the program commented using inline and javadoc comments?

3 Points – Was a suitable test case submitted with the program?

2 Points - Does it use parallel arrays properly?