

CS161: Introduction to Computer Science  
Homework Assignment 5  
Due: 2/22 by 11:59pm

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## Pair of Dice

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So far we've focused on writing a single standalone Java class, e.g. the `Orca` class. In practice, however, we often need to create multiple classes that interact with one another to accomplish some goal. Two common ways in which classes interact are,

1. A method in one class can take as input a variable of the same class type or another class type. Similarly, a method in one class can return a variable of the same class type or another class type. An example of this is the `BankAccount` and `Bank` classes.
2. A class can have instance variables which themselves have class type. An example of this is the `Brain`, `Stomach`, and `Organism` classes.

In this week's assignment, you will write a class whose instance variables themselves have class type. In particular, this assignment asks you to write a Java class called `PairOfDice` that represents a pair of dice.

You can use the `Die` class that we discussed in class to implement `PairOfDice`.

While I encourage you to write a separate class with a `main` method to test your `PairOfDice` class, it is not required for this assignment.

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## Programming Questions

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Open BlueJ and create a new project named `hw5`.

1. You will first need to create a Java class named `Die`. This class should represent a single die. A good way to practice for the exam is to see if you can recreate the `Die` class that we discussed in class without looking. You can check your class against the `Die` class posted for 2/6.
2. Once you've finished the `Die` class, create a new Java class named `PairOfDice`. This class should represent a pair of dice! Your class should have the following methods,
  - A constructor that takes no parameter. This constructor should create two 6-sided dice.
  - A constructor that takes a single `int` parameter representing the number of sides for both dice.
  - A constructor that takes two `int` parameters representing the number of sides for each die respectively. In this case, the two die can have a different number of sides.
  - The class isn't much good unless we can roll our pair of dice, so we'll need a `roll` method that rolls them both and returns the sum of both dice.
  - You should add an accessor method called `getNumRolls()` that returns the number of times we've rolled the dice.
  - Add a `toString()` method that builds and returns a string representing the state of the object. Your string should display the face values for both dice along with the number of times the dice have been rolled.
3. Finally, your code should have the appropriate Javadoc and inline (`//`) comments for full credit.

Below is an example of how you might use your `PairOfDice` class:

```

public static void main(String[] args){
    // Create a 10-sided die and a 20-sided die
    System.out.println("Creating a 10-sided and 20-sided dice...");
    PairOfDice pair = new PairOfDice(10, 20);

    // Roll the pair of dice
    int sum = pair.roll();
    int rolls = pair.getNumRolls();
    System.out.println("The sum is " + sum);
    System.out.println("The number of rolls is " + rolls);
    System.out.println(pair);

    // Roll them again
    sum = pair.roll();
    rolls = pair.getNumRolls();
    System.out.println("\nThe sum is " + sum);
    System.out.println("The number of rolls is " + rolls);
    System.out.println(pair);

    // Create two 8-sided die
    System.out.println("\n\nCreating two 8-sided dice...");
    PairOfDice pair2 = new PairOfDice(8);

    sum = pair2.roll();
    rolls = pair2.getNumRolls();
    System.out.println("\nThe sum is " + sum);
    System.out.println("The number of rolls is " + rolls);
    System.out.println(pair2);
}

```

Here is what would be printed to the screen:

```

BlueJ: Terminal Window - hw5_solution
Creating a 10-sided and 20-sided dice...
The sum is 19
The number of rolls is 1
[die1=10, die2=9, numRolls=1]

The sum is 13
The number of rolls is 2
[die1=8, die2=5, numRolls=2]

Creating two 8-sided dice...

The sum is 10
The number of rolls is 1
[die1=2, die2=8, numRolls=1]

```

## Submitting your lab assignment

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Submit your `hw5` folder with your `Die` and `PairOfDice` class inside. If you wrote a third class with a `main` method to test your `PairOfDice` class, feel free to include that as well.

Don't forget to rename your folder *before* zipping it and submitting it to Moodle.