

## 一、 实验名称

# Loops and Files

## 二、 实验目的

- Be able to convert an algorithm using control structures into Java
- Be able to write a while loop
- Be able to write an do-while loop
- Be able to write a for loop
- Be able to use the Random class to generate random numbers.
- Be able to use file streams for I/O
- Be able to write a loop that reads until end of file
- Be able to implement an accumulator and a counter

## 三、 实验内容

Task#1 Writing an Algorithm

Task #1 While loop

Task #2 Using Other Types of Loops

Task #3 Writing Output to a File

Task #4 Calculating the Mean

Task #5 Calculating the Standard Deviation

## 四、 实验方法(原理、流程图)

1. Written by IntelliJ IDEA Community edition 2020.3
- 2.

Task 1:

1. Copy the file DiceSimulation.java .
2. Write a while loop and an ifelse-if statement nested inside another if statement.
3. Use the nextInt method of the random number generator to generate an integer from 1 to 6.

Task 2:

1. Change the while loop to a do-while loop.
2. Change the do loop to a for loop.

Task 3:

1. Copy the files StatsDemo.java.
2. Create a FileWriter object passing it the filename "Results.txt" .Create a PrintWriter object passing it the FileWriter object. Add a throws clause to the main

method header. Print the mean and standard deviation to the output file using a three decimal format, labeling each. Close the output file.

#### Task4:

1. Create a FileReader object passing it the filename. Create a BufferedReader object passing it the FileReader object.
2. Write a priming read to read the first line of the file.
3. Write a loop that continues until you are at the end of the file.
4. When the program exits the loop close the input file.
5. Calculate and store the mean. The mean is calculated by dividing the accumulator by the counter.

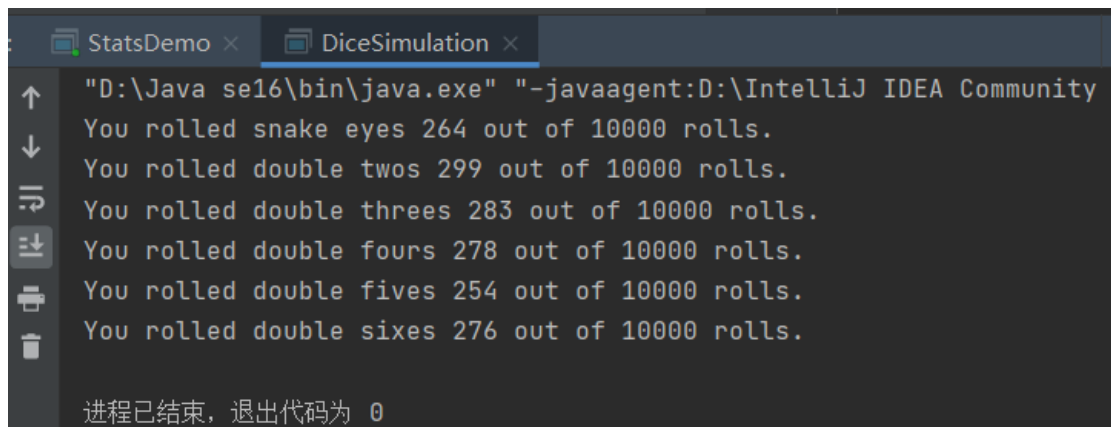
#### Task 5:

1. Create a FileReader object passing it the filename. Create a BufferedReader object passing it the FileReader object.
2. Reinitialize sum and count to 0.
3. Write a priming read to read the first line of the file.
4. Write a loop that continues until you are at the end of the file.
5. When the program exits the loop close the input file.
6. The variance is calculated by dividing the accumulator (sum of the squares of the difference) by the counter. Calculate the standard deviation by taking the square root of the variance (Use Math.sqrt ( ) to take the square root).

## 五、 实验结论

The experimental requirements have been successfully realized.

#### Task 1:



```
"D:\Java se16\bin\java.exe" "-javaagent:D:\IntelliJ IDEA Community
You rolled snake eyes 264 out of 10000 rolls.
You rolled double twos 299 out of 10000 rolls.
You rolled double threes 283 out of 10000 rolls.
You rolled double fours 278 out of 10000 rolls.
You rolled double fives 254 out of 10000 rolls.
You rolled double sixes 276 out of 10000 rolls.
进程已结束, 退出代码为 0
```

#### Task 2:

```
StatsDemo x dowhile x
"D:\Java se16\bin\java.exe" "-javaagent:D:\IntelliJ IDEA Community
You rolled snake eyes 276 out of 10000 rolls.
You rolled double twos 281 out of 10000 rolls.
You rolled double threes 274 out of 10000 rolls.
You rolled double fours 284 out of 10000 rolls.
You rolled double fives 281 out of 10000 rolls.
You rolled double sixes 281 out of 10000 rolls.

进程已结束，退出代码为 0
```

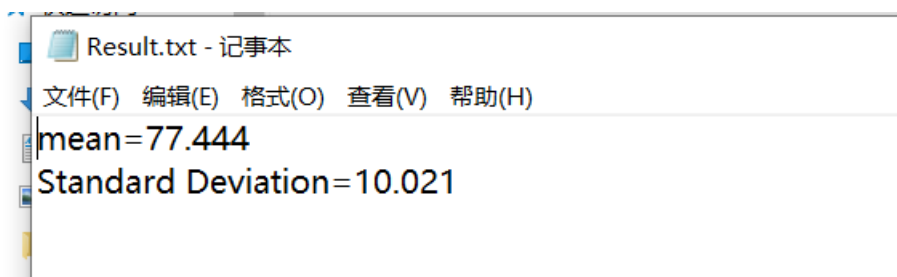
```
StatsDemo x forstatement x
"D:\Java se16\bin\java.exe" "-javaagent:D:\IntelliJ IDEA Commu
You rolled snake eyes 286 out of 10000 rolls.
You rolled double twos 280 out of 10000 rolls.
You rolled double threes 311 out of 10000 rolls.
You rolled double fours 275 out of 10000 rolls.
You rolled double fives 262 out of 10000 rolls.
You rolled double sixes 291 out of 10000 rolls.

进程已结束，退出代码为 0
```

Task 3、4、5:

```
StatsDemo x forstatement x
"D:\Java se16\bin\java.exe" "-javaagent:D:\IntelliJ IDEA Communit
This program calculates statisticson a file containing a series o
Enter the file name: D:\\\FFF\\计算机科学导论\\Numbers.txt

进程已结束，退出代码为 0
```



## 六、 实验体会和收获

1. Successfully practiced the for loop, do while loop, while loop and if statement.

2. Through this experiment, I am more familiar with file. In this process, I review and consolidate the IO stream. I find out my own shortcomings and where need to improve and further learn.

## 七、 程序代码

### Task 1:

```
/**  
  
    This class simulates rolling a pair of dice 10,000 times and  
  
    counts the number of times doubles of are rolled for each different  
  
    pair of doubles.  
  
*/  
  
import java.util.Random; //to use the random number generator  
  
public class DiceSimulation  
{  
  
    public static void main(String[] args)  
    {  
  
        final int NUMBER = 10000; //the number of times to roll the dice  
  
        //a random number generator used in simulating rolling a dice  
  
        Random generator = new Random();  
  
  
  
        int die1Value; // number of spots on the first die  
  
        int die2Value; // number of spots on the second die  
  
        int count = 0; // number of times the dice were rolled  
  
        int snakeEyes = 0; // number of times snake eyes is rolled  
  
        int twos = 0; // number of times double two is rolled
```

```
int threes = 0; // number of times double three is rolled
```

```
int fours = 0; // number of times double four is rolled
```

```
int fives = 0; // number of times double five is rolled
```

```
int sixes = 0; // number of times double six is rolled
```

```
while(count<NUMBER)
```

```
{
```

```
    die1Value=generator.nextInt(6);
```

```
    die2Value=generator.nextInt(6);
```

```
    if (die1Value == die2Value)
```

```
    {
```

```
        if(die1Value == 0)
```

```
        {
```

```
            snakeEyes++;
```

```
        }
```

```
        else if(die1Value == 1)
```

```
        {
```

```
            twos++;
```

```
        }
```

```
        else if(die1Value==2)
```

```
        {
```

```
            threes++;
```

```
        }
```

```
else if(die1Value==3)
```

```
{
```

```
fours++;
```

```
}
```

```
else if(die1Value==4)
```

```
{
```

```
fives++;
```

```
}
```

```
else if (die1Value==5)
```

```
{
```

```
sixes++;
```

```
}
```

```
}
```

```
count++;
```

```
}
```

```
//ENTER YOUR CODE FOR THE ALGORITHM HERE
```

```
System.out.println ("You rolled snake eyes " + snakeEyes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double twos " + twos +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double threes " + threes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fours " + fours +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fives " + fives +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double sixes " + sixes +
```

```
" out of " + count + " rolls.");
```

```
}
```

```
}
```

## Task 2:

do while:

```
import java.util.Random;
```

```
public class dowhile {
```

```
    public static void main(String[] args)
```

```
{
```

```
    final int NUMBER = 10000; //the number of times to roll the dice
```

```
    //a random number generator used in simulating rolling a dice
```

```
    Random generator = new Random();
```

```
    int die1Value; // number of spots on the first die
```

```
    int die2Value; // number of spots on the second die
```

```
int count = 0; // number of times the dice were rolled
```

```
int snakeEyes = 0; // number of times snake eyes is rolled
```

```
int twos = 0; // number of times double two is rolled
```

```
int threes = 0; // number of times double three is rolled
```

```
int fours = 0; // number of times double four is rolled
```

```
int fives = 0; // number of times double five is rolled
```

```
int sixes = 0; // number of times double six is rolled
```

```
do{
```

```
    die1Value=generator.nextInt(6);
```

```
    die2Value=generator.nextInt(6);
```

```
    if (die1Value == die2Value)
```

```
    {
```

```
        if(die1Value == 0)
```

```
        {
```

```
            snakeEyes++;
```

```
        }
```

```
        else if(die1Value == 1)
```

```
        {
```

```
            twos++;
```

```
        }
```

```
        else if(die1Value==2)
```

```
        {
```



```
threes++;
```

```
}
```

```
else if(die1Value==3)
```

```
{
```

```
fours++;
```

```
}
```

```
else if(die1Value==4)
```

```
{
```

```
fives++;
```

```
}
```

```
else if (die1Value==5)
```

```
{
```

```
sixes++;
```

```
}
```

```
}
```

```
count++;
```

```
}
```

```
while(count<NUMBER);
```

```
//ENTER YOUR CODE FOR THE ALGORITHM HERE
```

```
System.out.println ("You rolled snake eyes " + snakeEyes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double twos " + twos +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double threes " + threes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fours " + fours +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fives " + fives +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double sixes " + sixes +
```

```
" out of " + count + " rolls.");
```

```
}
```

```
}
```

**For :**

```
/**
```

```
This class simulates rolling a pair of dice 10,000 times and
```

```
counts the number of times doubles of are rolled for each different
```

```
pair of doubles.
```

```
*/
```

```
import java.util.Random; //to use the random number generator
```

```
public class forstatement
```

```
{
```

```
    public static void main(String[] args)
```

```
{
```

```
    final int NUMBER = 10000; //the number of times to roll the dice
```

```
    //a random number generator used in simulating rolling a dice
```

```
    Random generator = new Random();
```

```
    int die1Value; // number of spots on the first die
```

```
    int die2Value; // number of spots on the second die
```

```
    int count = 0; // number of times the dice were rolled
```

```
    int snakeEyes = 0; // number of times snake eyes is rolled
```

```
    int twos = 0; // number of times double two is rolled
```

```
    int threes = 0; // number of times double three is rolled
```

```
    int fours = 0; // number of times double four is rolled
```

```
    int fives = 0; // number of times double five is rolled
```

```
    int sixes = 0; // number of times double six is rolled
```

```
    for(count=0;count<NUMBER;count++)
```

```
    {
```

```
        die1Value=generator.nextInt(6);
```

```
        die2Value=generator.nextInt(6);
```

```
        if (die1Value == die2Value)
```

```
        {
```

```
            if(die1Value == 0)
```

```
            {
```

```
snakeEyes++;
```

```
}
```

```
else if(die1Value == 1)
```

```
{
```

```
twos++;
```

```
}
```

```
else if(die1Value == 2)
```

```
{
```

```
threes++;
```

```
}
```

```
else if(die1Value == 3)
```

```
{
```

```
fours++;
```

```
}
```

```
else if(die1Value == 4)
```

```
{
```

```
fives++;
```

```
}
```

```
else if(die1Value == 5)
```

```
{
```

```
sixes++;
```

```
}
```

```
}
```

```
}
```

```
//ENTER YOUR CODE FOR THE ALGORITHM HERE
```

```
System.out.println ("You rolled snake eyes " + snakeEyes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double twos " + twos +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double threes " + threes +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fours " + fours +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double fives " + fives +
```

```
" out of " + count + " rolls.");
```

```
System.out.println ("You rolled double sixes " + sixes +
```

```
" out of " + count + " rolls.");
```

```
}
```

```
}
```

**Task3、 4、 5:**

```
import java.text.DecimalFormat; //for number formatting
```

```
import java.util.Scanner; //for keyboard input
```

```
//ADD AN IMPORT STATEMENT HERE //for using files
```

```
import java.io.*;

public class StatsDemo
{
    public static void main(String [] args)throws IOException//ADD A THROWS
    CLAUSE HERE
    {
        double sum = 0; //the sum of the numbers

        int count = 0; //the number of numbers added

        double mean = 0; //the average of the numbers

        double stdDev = 0; //the standard deviation of the numbers

        String line; //a line from the file

        double difference; //difference between the value and the mean

        //create an object of type Decimal Format

        DecimalFormat threeDecimals = new DecimalFormat("0.000");

        //create an object of type Scanner

        Scanner keyboard = new Scanner (System.in);

        String filename; // the user input file name

        //Prompt the user and read in the file name

        System.out.println("This program calculates statistics"
            + "on a file containing a series of numbers");

        System.out.print("Enter the file name: ");

        filename = keyboard.nextLine();
```

```
//ADD LINES FOR TASK #4 HERE
```

```
FileReader fileReader=new FileReader(filename);
```

```
BufferedReader bufferedReader=new BufferedReader(fileReader);
```

```
line=bufferedReader.readLine();
```

```
while(line!=null)
```

```
{
```

```
    sum+=Double.parseDouble(line);
```

```
    count++;
```

```
    line= bufferedReader.readLine();
```

```
}
```

```
fileReader.close();
```

```
bufferedReader.close();
```

```
mean=sum/count;
```

```
//Create a FileReader object passing it the filename
```

```
//Create a BufferedReader object passing it the FileReader object.
```

```
//priming read to read the first line of the file
```

```
//create a loop that continues until you are at the end of the file
```

```
//convert the line to double value, add the value to the sum
```

```
//increment the counter
```

```
//read a new line from the file
```

```
//close the input file
```

```
//store the calculated mean
```

```
//ADD LINES FOR TASK #5 HERE
```

```
FileReader fileReader1=new FileReader(filename);
```

```
BufferedReader bufferedReader1=new BufferedReader(fileReader1);
```

```
sum=0;
```

```
count=0;
```

```
line=bufferedReader1.readLine();
```

```
while(line!=null)
```

```
{
```

```
    difference=Double.parseDouble(line)-mean;
```

```
    sum+=(difference*difference);
```

```
    count++;
```

```
    line= bufferedReader1.readLine();
```

```
}
```

```
fileReader1.close();
```

```
bufferedReader1.close();
```

```
sum/=count;
```

```
stdDev=Math.sqrt(sum);
```

```
//create a FileReader object passing it the filename
```

```
//create a BufferedReader object passing it the FileReader object.
```

```
//reinitialize the sum of the numbers
```

```
//reinitialize the number of numbers added
```



```
//priming read to read the first line of the file
```

```
//loop that continues until you are at the end of the file
```

```
//convert the line into a double value and subtract the mean
```

```
//add the square of the difference to the sum
```

```
//increment the counter
```

```
//read a new line from the file
```

```
//close the input file
```

```
//store the calculated standard deviation
```

```
//ADD LINES FOR TASK #3 HERE
```

```
FileWriter fileWriter=new FileWriter("D:\\FFF\\itellij\\Result.txt");
```

```
PrintWriter printWriter=new PrintWriter(fileWriter);
```

```
printWriter.println("mean="+threeDecimals.format(mean));
```

```
printWriter.println("Standard Deviation="+threeDecimals.format(stdDev));
```

```
fileWriter.close();
```

```
printWriter.close();
```

```
//create an object of type FileWriter using "Results.txt"
```

```
//create an object of PrintWriter passing it the FileWriter object.
```

```
//print the results to the output file
```

```
//close the output file
```

```
}
```

```
}
```

