作业要求：

1、时间要求：提交作业的截止日期就是 10 月 27 日；

2、形式要求：以电子档的方式提交，，通过 Email 到 homework.xjtu@qq.com 邮箱，邮件主题的格式为"班级--学号--姓名"即可；（比如：软件 31-2131601100-张五）

3、内容要求：提交源程序（以压缩文件格式）和一个作业报告，其中作业报告为 word 文档，包含设计过程、主干代码呈现和运行结果展示。请不要将 word 文档和源程序压缩到一个包中，谢谢。

Preparing knowledge:

1.How to read data from Console or File?

The java.util.Scanner class is used to read strings and primitive values from the console or File. Figure 1 gives an example that creats an instance of Scanner and reads data from the console.

```
1 import java.util.Scanner; // Scanner is in the java.util package
2
3 public class ComputeAverage {
4   public static void main(String[] args) {
5     // Create a Scanner object
6     Scanner input = new Scanner(System.in);
7
8     // Prompt the user to enter three numbers
9     System.out.print("Enter three numbers: ");
10    double number1 = input.nextDouble();
11    double number2 = input.nextDouble();
12    double number3 = input.nextDouble();
13
14    // Compute average
15    double average = (number1 + number2 + number3) / 3;
16
17    // Display result
18    System.out.println("The average of " + number1 + " " + number2
19      + " " + number3 + " is " + average);
20  }
21 }
```

```
Enter three numbers: 1 2 3 Enter
The average of 1.0 2.0 3.0 is 2.0
```

```
Enter three numbers: 10.5 Enter
11 Enter
11.5 Enter
The average of 10.5 11.0 11.5 is 11.0
```

Figure 1

A Scanner breaks its input into tokens delimited by whitespace characters.

To read from the keyboard, you create a Scanner for System.in, as follows:

```
Scanner input = new Scanner(System.in);
```

To read from a file, create a Scanner for a file, as follows:

```
Scanner input = new Scanner(new File(filename));
```

Figure 2 summarizes frequently used methods in Scanner.

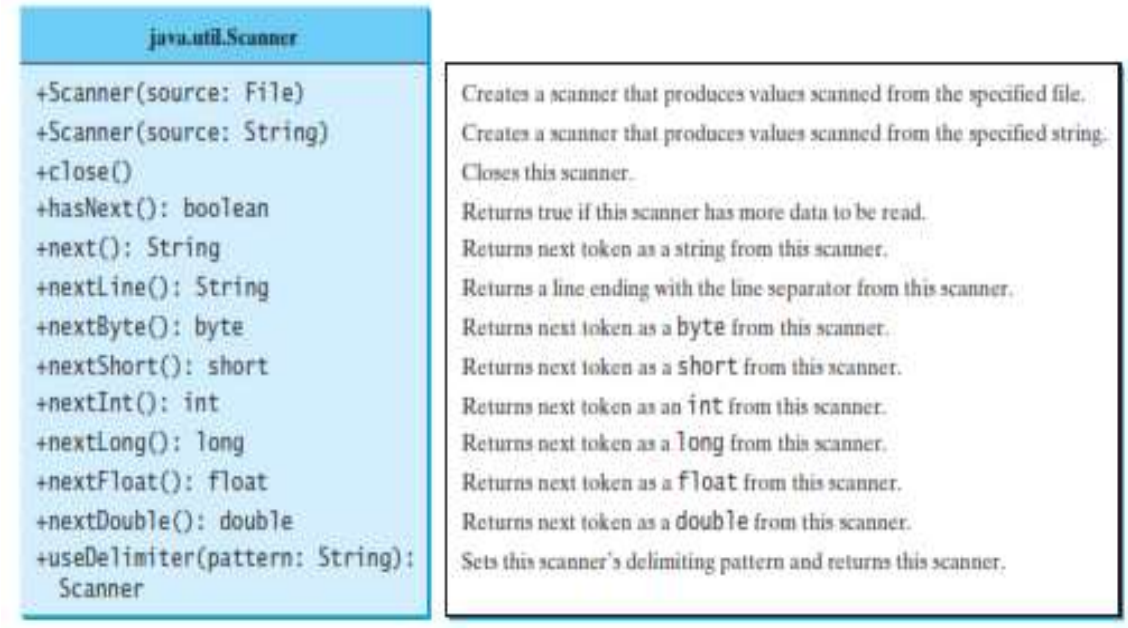


Figure 2

Figure 3 gives an example that creats an instance of Scanner and reads data from the file "scores.txt".

```
1  import java.util.Scanner;
2
3  public class ReadData {
4    public static void main(String[] args) throws Exception {
5      // Create a File instance
6      java.io.File file = new java.io.File("scores.txt");          create a File
7
8    // Create a Scanner for the file
9    Scanner input = new Scanner(file);                             create a Scanner
10
11   // Read data from a file                          scores.txt
12   while (input.hasNext()) {                        John T Smith 90   has next?
13     String firstName = input.next();               Eric K Jones 85   read items
14     String mi = input.next();
15     String lastName = input.next();
16     int score = input.nextInt();
17     System.out.println(
18       firstName + " " + mi + " " + lastName + " " + score);
19   }
20
21   // Close the file
22   input.close();                                               close file
23   }
24 }
```

Figure 3

2. Variable-Length Argument Lists

You can pass a variable number of arguments of the same type to a method. The parameter in the method is declared as follows:

typeName... parameterName

In the method declaration, you specify the type followed by an ellipsis Only one variable-length parameter may be specified in a method, and this parameter must be the last parameter. Any regular parameters must precede it.

Java treats a variable-length parameter as an array. You can pass an array or a variable number of arguments to a variable-length parameter. When invoking a method with a variable number of arguments, Java creates an array and passes the arguments to it. Figure 4 contains a method that prints the maximum value in a list of an unspecified number of values.

```
1  public class VarArgsDemo {
2    public static void main(String[] args) {
3      printMax(34, 3, 3, 2, 56.5);

4      printMax(new double[]{1, 2, 3});
5    }
6
7    public static void printMax(double... numbers) {
8      if (numbers.length == 0) {
9        System.out.println("No argument passed");
10       return;
11     }
12
13     double result = numbers[0];
14
15     for (int i = 1; i < numbers.length; i++)
16       if (numbers[i] > result)
17         result = numbers[i];
18
19     System.out.println("The max value is " + result);
20   }
21 }
```

Figure 4

Line 3 invokes the printMax method with a variable-length argument list passed to the array numbers. If no arguments are passed, the length of the array is 0 (line 8). Line 4 invokes the printMax method with an array.

Homework:

1. Random number chooser

Write a method that returns a random number between 1 and 54,(Hint: Use Math.random( )) excluding the numbers passed in the argument. The method header is specified as follows:

public static int getRandom(int... numbers)

2. Pattern recognition: consecutive four equal numbers

Write the following method that tests whether a two-dimensional array has four consecutive numbers of the same value, either horizontally,vertically,or diagonally.

public static boolean isConsecutiveFour(int[][] values)

Write a test program that prompts the user to enter the number of rows and columns of a two-dimensional array and then the values in the array and displaystrue if the array contains four consecutive numbers with the same value.Otherwise,display false.

Here are some examples of the true cases（Figure 5）:

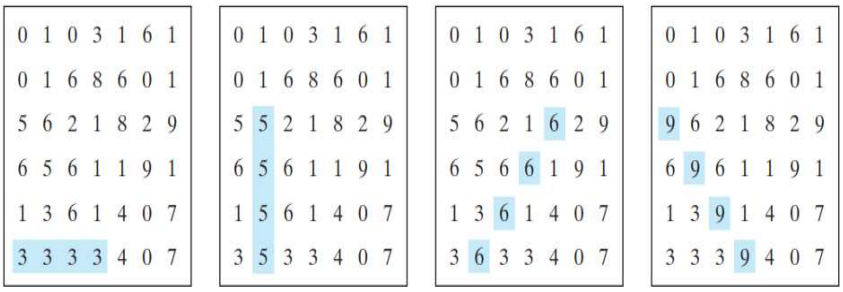


Figure 5

3.Implementing the StringBuilder class

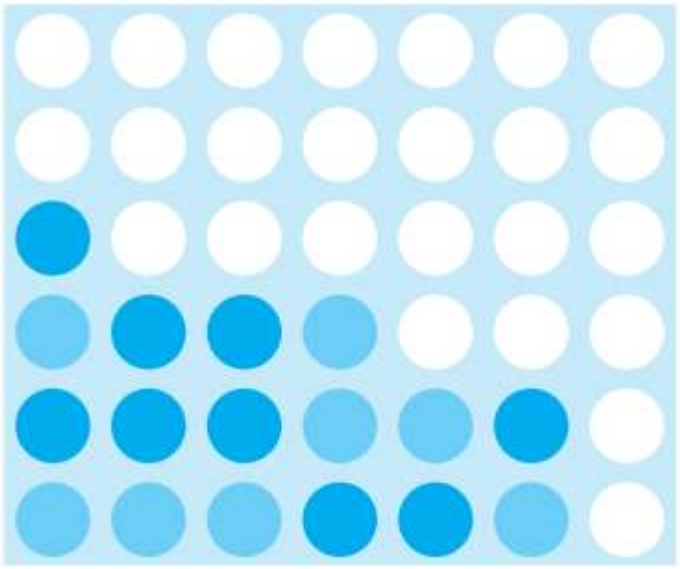
The StringBuilder class is provided in the Java library. Provide your own implementation for the following methods (name the new class MyStringBuilder1):

public MyStringBuilder1(String s);
public MyStringBuilder1 append(MyStringBuilder1 s);
public MyStringBuilder1 append(int i);
public int length();
public char charAt(int index);
public MyStringBuilder1 toLowerCase();
public MyStringBuilder1 substring(int begin, int end);

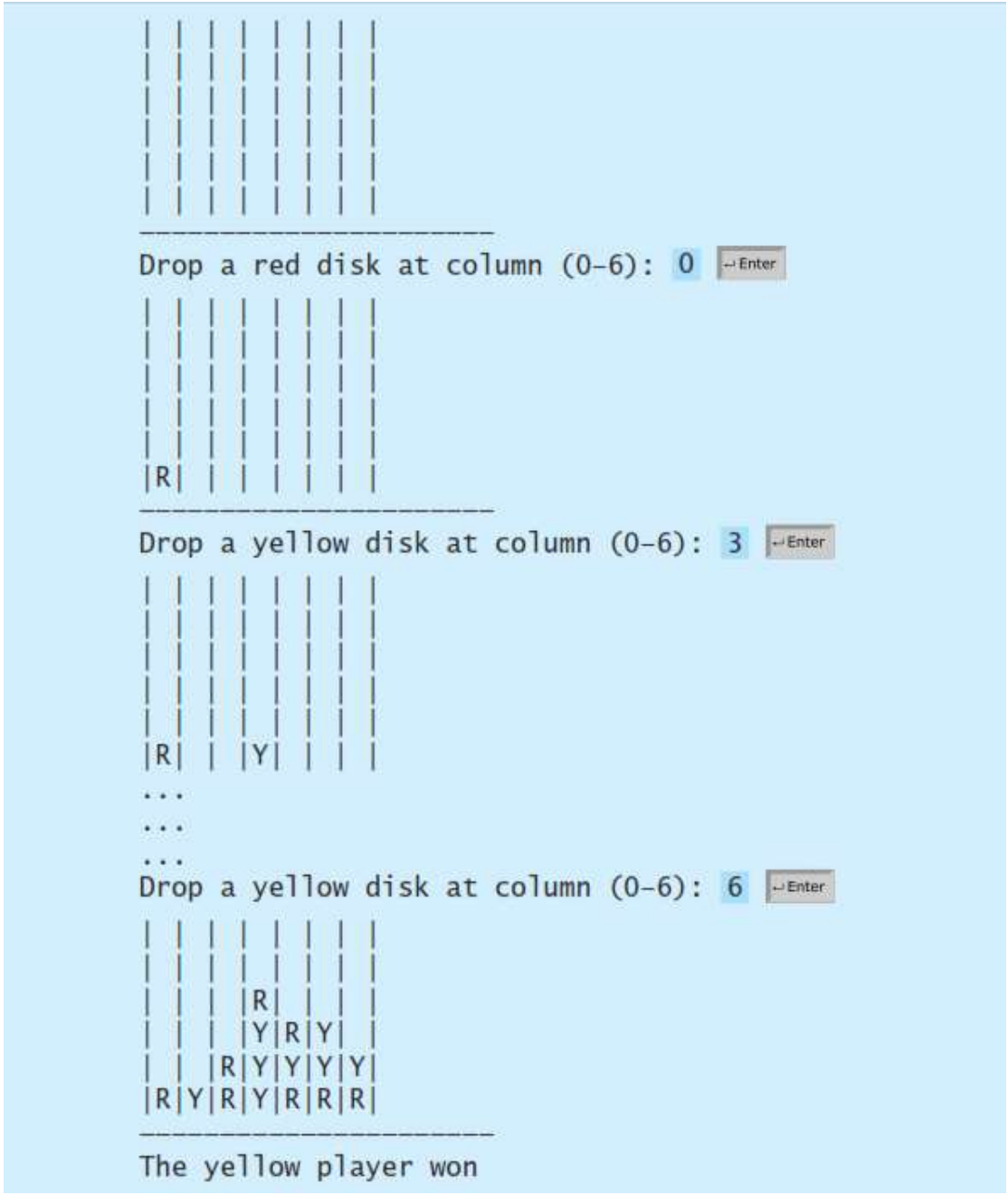
public String toString();

4. Game: connect four

Connect four is a two-player board game in which the players alternately drop colored disks into a seven-column, six-row verticallysuspended grid, as shown below.



The objective of the game is to connect four same-colored disks in a row, a column, or a diagonal before your opponent can do likewise. The program prompts two players to drop a RED or YELLOW disk alternately. Whenever a disk is dropped, the program redisplays the board on the console and determines the status of the game (win, draw, or continue). Here is a sample run:


Drop a red disk at column (0–6): 0
Enter
R						
Drop a yellow disk at column (0–6): 3
Enter
R			Y			
...
...
...
Drop a yellow disk at column (0–6): 6
Enter
			R			
			Y	R	Y	
		R	Y	Y	Y	Y
R	Y	R	Y	R	R	R
The yellow player won