

# Java Programming Laboratory

## Java Syntax

**Exercise 1.** Enter, compile and run the Java program below, which asks the user for an integer number and then calculates the sum of numbers. The program uses a function called SumUp which uses a for loop to calculate the sum of numbers.

```
import java.util.Scanner;

public class Controller {

    public static void main(String[] args) {
        int number, sum;
        Scanner sc = new Scanner(System.in);
        sum =0;
        System.out.println("Please enter a number to sum up to > ");
        number =sc.nextInt();
        sum = sumUp(number);
        System.out.println("sum = "+sum);
    }

    public static int sumUp(int num)
    {
        int total=0;
        for (int i=1; i<= num; i++)
        {
            total+=i;
        }
        return total;
    }
}
```

**Exercise 2.** Enter, compile and run the Java program below which demonstrates how to remain inside a while loop until the character “N” is selected.

```
import java.util.Scanner;

public class Controller {

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        char ans;
        System.out.println("Do you want to go into the loop [Y/N] > ");
        ans =sc.next().charAt(0);
        while (ans=='Y')
        {
            System.out.println("Do you want to stay into the loop [Y/N] > ");
            ans =sc.next().charAt(0);
        }
        System.out.println("Program finished ");
    }
}
```

**Exercise 3.** Enter, compile and run the Java program below which demonstrates the syntax of a do-while loop and uses an if-else statement to calculate a bank balance when money is withdrawn or deposited into an initial balance.

```
import java.util.Scanner;
public class Controller {

    /**
     * @author Alan
     */
    public static void main(String[] args) {

        float balance=0.0f;
        float withdraw =0.0f;
        float deposit =0.0f;
        System.out.println("Please enter the bank balance");
        Scanner aScanner = new Scanner(System.in);

        balance =aScanner.nextFloat();
        System.out.println("Balance = "+balance);
        String commandStr="";

        do
        {
            System.out.println("Enter q=quit, w=withdraw, d=deposit");
            commandStr=aScanner.next();

            if(commandStr.equals("w"))
            {
                //withdrawn money
                System.out.println("Enter amount to withdraw");
                withdraw=aScanner.nextFloat();
                balance=balance-withdraw;
            }
            else if(commandStr.equals("d"))
            {
                //deposit money
                System.out.println("Enter amount to deposit");
                deposit =aScanner.nextFloat();
                balance=balance+deposit;
            }

            System.out.println("New balance = "+balance)        ;
        }while(!commandStr.equals("q"));

    }
}
```

**Exercise 4.** Design and write a Java program that reads in a series of whole (integer) numbers terminated by -9999 and prints out the sum of the numbers entered. Then

- (a) Amend the program so that only valid numbers between 1 and 100 inclusive are summed
- (b) Amend the program so that an error message is printed each time an invalid number is entered
- (c) Amend the program so that the largest number entered is also output.

**Exercise 5.** Consider a bank that offers four different types of account: (S)aver,

(D)eposit, (C)hild and (L)ong term investment, each of which has a different interest rate:

S: 3%  
D: 0.5%  
C: 1.5%  
L: 4%

Design and write a program that allows a user to enter an amount of money into a type of bank savings account and then uses a switch statement to output the value of their investment after one year. For example:

```
Please enter an amount: 100
Please enter an account type S=Saver, D=Deposit, C=child L=Long: S
Value after one year is 103.0
```

**Exercise 6.** Write a program which declares an integer array called “arry” to hold six integer values. Then undertake the following tasks:-

- Load the values 1,2,3,4,5,6 into each of the array elements starting at index 0
- Print the value stored in the array at index 1
- Use a for-loop to print out the values of the array to the console screen
- Use a for-loop to load the values 0, 2,4,6,8,10 into the array
- Use a for-each loop to print out the values in the array

**Exercise 7.** Bubble sort is a simple sorting algorithm that repeatedly steps through the list of values to be sorted, comparing each pair of adjacent items and swaps them if they are in the wrong order. A bubble sort algorithm for sorting an array of integer values is shown below.

```
private static void bubblesort(int[] a)
{
    for(int i =0; i<a.length; i++)
    {
        for(int j =1; j<(a.length-i); j++)
        {
            if (a[j-1]>a[j])
                swap(a, j-1, j);
        }
    }
}

private static void swap(int[] a, int x ,int y)
{
    int tempStore = a[x];
    a[x] =a[y];
    a[y] =tempStore;
}
```

Undertake the following tasks:-

- a) Declare an integer array of size 50
- b) Fill the array with random integer values in the range 0 to 100
- c) Use a for-loop to print the values on a single line to the console screen with each value separated with a space
- d) Bubble sort the array
- e) Use a for-loop to print the sorted values on a single line to the console screen with each value separated with a space

**Exercise 8:** Write a Java temperature converter program. The formula for converting temperature in Celsius to Fahrenheit is

$$\text{Fahrenheit} = (9/5) * \text{Celsius} + 32$$

The formula for converting temperature from Fahrenheit to Celsius is

$$\text{Celsius} = (5/9) * (\text{Fahrenheit} - 32)$$

Check that if the temperature is 35 in Celsius, the equivalent value in Fahrenheit is  $(9/5) * 35 + 32 = 95$  F. Conversely, check that if the temperature is 95 in Fahrenheit, the equivalent value in Celsius is  $(5/9) * (95 - 32) = 35$ .

**Exercise 9.** Implement a currency conversion program which uses a switch case statement to convert pounds to US Dollars, Euros and Australian Dollars. Assume that the exchange rates are:-

£1 = 1.5 US Dollars

£1 = 1.4 Euros

£1 = 1.9 Australian Dollars

Exchange rates are fluctuating on a daily basis. We can use the Yahoo Finance API online service for finding exchange rates.

<http://finance.yahoo.com/currency-converter/>

Change the currency converter code to use current rates.

**Exercise 10.** Exceptions are handled in a try-catch-finally block. Enter, compile and run the Java program below which demonstrates the syntax of try-catch-finally block for a checked exception.

```
import java.io.BufferedReader;
import java.io.FileReader;
import java.io.IOException;

public class Controller {

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

```

    FileReader file =null;
    BufferedReader fileInput =null;
    try {
        file = new FileReader("test.txt");
        fileInput = new BufferedReader(file);
        for (int counter = 0; counter < 3; counter++)
            System.out.println(fileInput.readLine());

    } catch (IOException e) {

        e.printStackTrace();
    }
    finally {
        try {
            fileInput.close();
            file.close();
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}

```

Dr Alan Crispin  
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