

Міністерство освіти, науки, молоді та спорту України
Національний університет «Львівська політехніка»

Кафедра СШ

Лабораторна робота №2

Виконав:
ст. групи КН-107
Белан В.Ю
Прийняв:
Старший викладач
Гасько Р.Т.

Львів-2018

Мета: Пройти третій тиждень курсу вивчення Java на Prometheus, навчитись створювати зв'язний список і використовувати рекурсію в Java

Завдання 1

```
public class SquareRoot {  
    public static void main(String[] args) {  
        double a = 3;  
        double b = 2.5;  
        double c = -0.5;  
        double d = b * b - 4 * a * c;  
        if (d>0 & (a!=0 & c!=0) ) {  
            System.out.println("x1=" + (-b + Math.sqrt(d)) / (2*a));  
            System.out.println("x2=" + (-b - Math.sqrt(d)) / (2*a));  
        }  
        else if (a==0 & b!=0 & c==0) {  
            System.out.println("x1="+0.0);  
            System.out.println("x2="+0.0);  
        }  
        else if (d==0 & a!=0) {  
            System.out.println("x1=" + (-b / (2*a)));  
            System.out.println("x2=" + (-b / (2*a)));  
        }  
        else {  
            System.out.println("x1=");  
            System.out.println("x2=");  
        }  
    }  
}
```

OOP - Laba2/src/SquareRoot.java - Eclipse

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SquareRoot.java

```
1
2 public class SquareRoot {
3     public static void main(String[] args) {
4         double a = 3;
5         double b = 2.5;
6         double c = -0.5;
7         double d = b * b - 4 * a * c;
8         if (d>0 & (a!=0 & c!=0) ) {
9             System.out.println("x1=" + (-b + Math.sqrt(d)) / (2*a));
10            System.out.println("x2=" + (-b - Math.sqrt(d)) / (2*a));
11        }
12        else if (a==0 & b!=0 & c==0) {
13            System.out.println("x1="+0.0);
14            System.out.println("x2="+0.0);
15        }
16        else if (d==0 & a!=0) {
17            System.out.println("x1=" + (-b / (2*a)));
18            System.out.println("x2=" + (-b / (2*a)));
19        }
20        else {
21            System.out.println("x1=");
22            System.out.println("x2=");
23        }
24    }
25 }
26
27
```

@ Javadoc Console

<terminated> SquareRoot [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (29 мая 2018 г., 0:38:00)

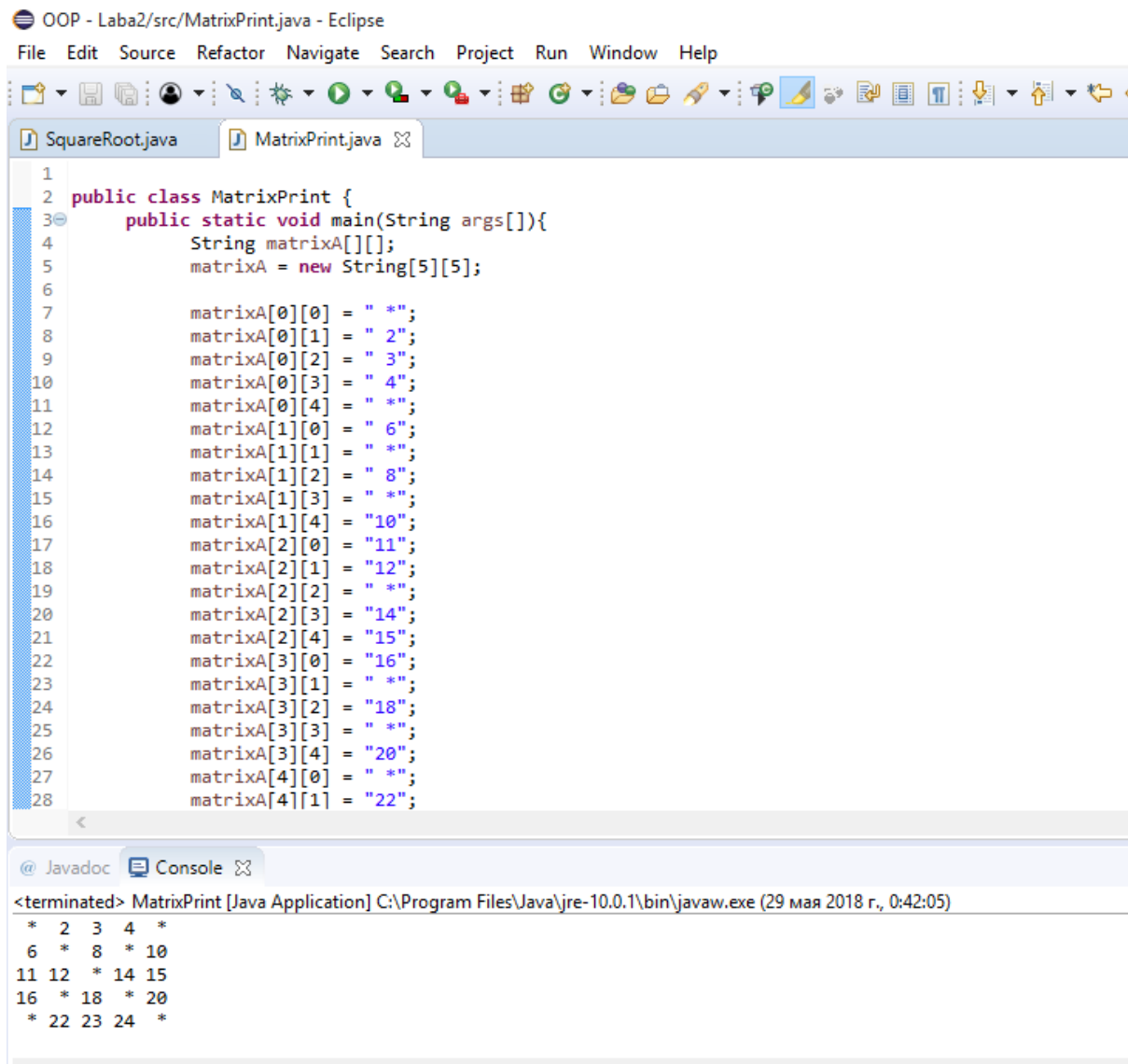
x1=0.16666666666666666
x2=-1.0

Завдання 2

```
public class MatrixPrint {  
    public static void main(String args[]){  
        String matrixA[][];  
        matrixA = new String[5][5];
```

```
        matrixA[0][0] = " *";  
        matrixA[0][1] = " 2";  
        matrixA[0][2] = " 3";  
        matrixA[0][3] = " 4";  
        matrixA[0][4] = " *";  
        matrixA[1][0] = " 6";  
        matrixA[1][1] = " *";  
        matrixA[1][2] = " 8";
```

```
matrixA[1][3] = " *";
matrixA[1][4] = "10";
matrixA[2][0] = "11";
matrixA[2][1] = "12";
matrixA[2][2] = " *";
matrixA[2][3] = "14";
matrixA[2][4] = "15";
matrixA[3][0] = "16";
matrixA[3][1] = " *";
matrixA[3][2] = "18";
matrixA[3][3] = " *";
matrixA[3][4] = "20";
matrixA[4][0] = " *";
matrixA[4][1] = "22";
matrixA[4][2] = "23";
matrixA[4][3] = "24";
matrixA[4][4] = " *";
for (int i = 0; i < 5; i++) {
    for (int j = 0; j < 5; j++) {
        System.out.print(matrixA[i][j] + " ");
    }
    System.out.println();
}
}
```



OOP - Laba2/src/MatrixPrint.java - Eclipse

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SquareRoot.java MatrixPrint.java

```
1
2 public class MatrixPrint {
3     public static void main(String args[]){
4         String matrixA[][];
5         matrixA = new String[5][5];
6
7         matrixA[0][0] = " *";
8         matrixA[0][1] = " 2";
9         matrixA[0][2] = " 3";
10        matrixA[0][3] = " 4";
11        matrixA[0][4] = " *";
12        matrixA[1][0] = " 6";
13        matrixA[1][1] = " *";
14        matrixA[1][2] = " 8";
15        matrixA[1][3] = " *";
16        matrixA[1][4] = "10";
17        matrixA[2][0] = "11";
18        matrixA[2][1] = "12";
19        matrixA[2][2] = " *";
20        matrixA[2][3] = "14";
21        matrixA[2][4] = "15";
22        matrixA[3][0] = "16";
23        matrixA[3][1] = " *";
24        matrixA[3][2] = "18";
25        matrixA[3][3] = " *";
26        matrixA[3][4] = "20";
27        matrixA[4][0] = " *";
28        matrixA[4][1] = "22";
```

@ Javadoc Console

<terminated> MatrixPrint [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (29 мая 2018 г., 0:42:05)

```
* 2 3 4 *
6 * 8 * 10
11 12 * 14 15
16 * 18 * 20
* 22 23 24 *
```

Завдання 3

```
public class ArraySort {
```

```
    public static void main(String[] args) {
        int[] array = {30, 2, 10, 4, 6};
        int length = array.length;
```

```
        for(int i = 0; i < length; i++)
            for(int j = i + 1; j < length; j++){
                if(array[j]<array[i]) {
                    int tmp=array[j];
                    array[j]=array[i];
```

```

    array[i]=tmp;
}
}
for (int i = 0; i < length; i++) {
    System.out.print(array[i] + " ");
}
}

```

OOP - Laba2/src/ArraySort.java - Eclipse

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SquareRoot.java MatrixPrint.java ArraySort.java

```

1
2 public class ArraySort {
3     public static void main(String[] args) {
4         int[] array = {30, 2, 10, 4, 6};
5         int length = array.length;
6
7
8         for(int i = 0; i < length; i++)
9             for(int j = i + 1; j < length; j++){
10                if(array[j]<array[i]) {
11                    int tmp=array[j];
12                    array[j]=array[i];
13                    array[i]=tmp;
14                }
15            }
16        for (int i = 0; i < length; i++) {
17            System.out.print(array[i] + " ");
18        }
19    }
20 }
21

```

@ Javadoc Console

<terminated> ArraySort [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (29 мая 2018 г., 0:43:29)

2 4 6 10 30

Завдання 4

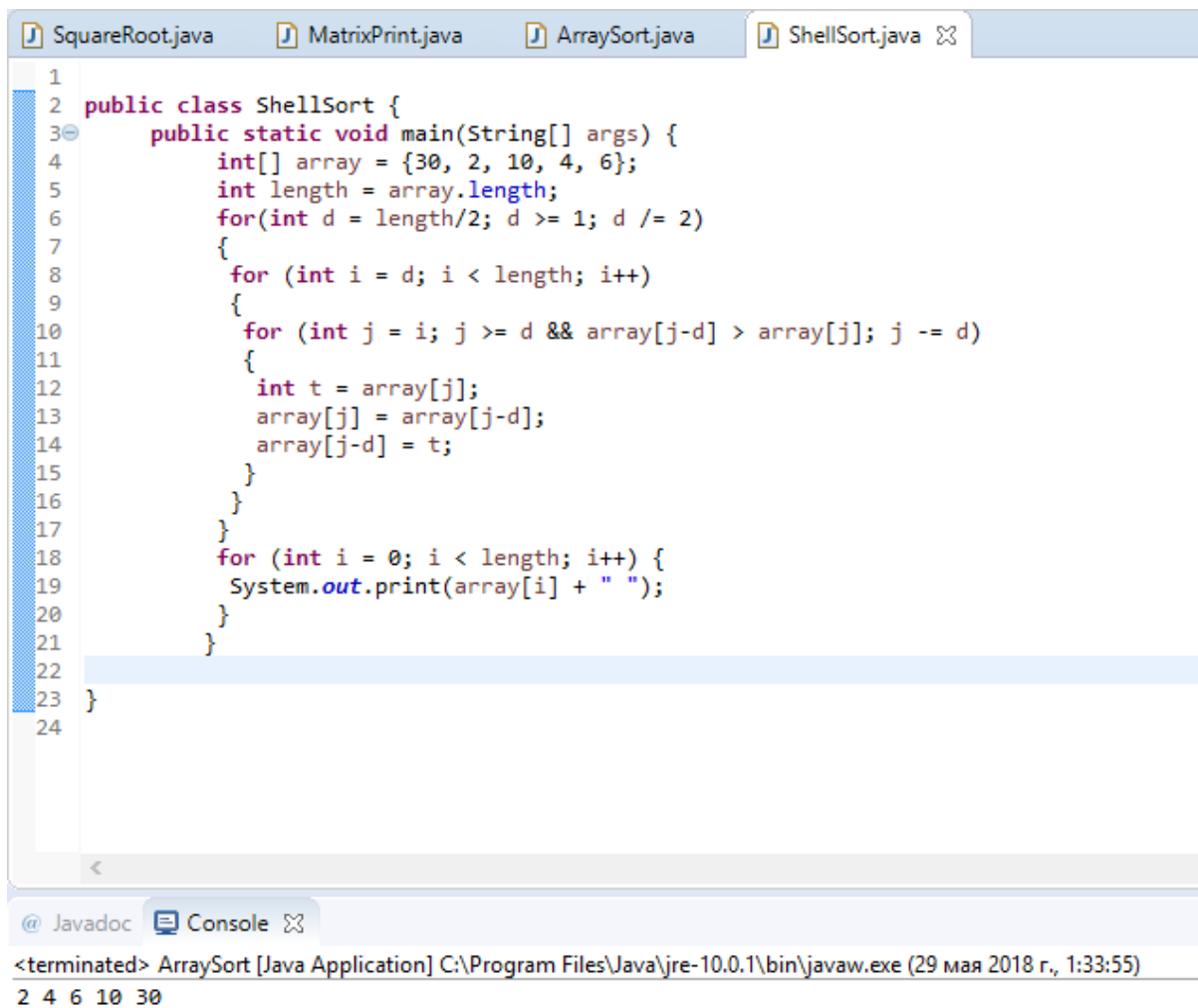
```

public class ShellSort {

    public static void main(String[] args) {
        int[] array = {30, 2, 10, 4, 6};
    }
}

```

```
int length = array.length;
for(int d = length/2; d >= 1; d /= 2)
{
    for (int i = d; i < length; i++)
    {
        for (int j = i; j >= d && array[j-d] > array[j]; j -= d)
        {
            int t = array[j];
            array[j] = array[j-d];
            array[j-d] = t;
        }
    }
}
for (int i = 0; i < length; i++) {
    System.out.print(array[i] + " ");
}
}
```



The screenshot shows an IDE with four tabs: SquareRoot.java, MatrixPrint.java, ArraySort.java, and ShellSort.java. The ShellSort.java tab is active, displaying the following code:

```
1 public class ShellSort {
2     public static void main(String[] args) {
3         int[] array = {30, 2, 10, 4, 6};
4         int length = array.length;
5         for(int d = length/2; d >= 1; d /= 2)
6         {
7             for (int i = d; i < length; i++)
8             {
9                 for (int j = i; j >= d && array[j-d] > array[j]; j -= d)
10                {
11                    int t = array[j];
12                    array[j] = array[j-d];
13                    array[j-d] = t;
14                }
15            }
16        }
17        for (int i = 0; i < length; i++) {
18            System.out.print(array[i] + " ");
19        }
20    }
21 }
22
23
24
```

Below the code editor, the console output is shown:

```
<terminated> ArraySort [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (29 мая 2018 г., 1:33:55)
2 4 6 10 30
```

Завдання 5

```
public class BinarySearch {

    public static void main(String[] args) {

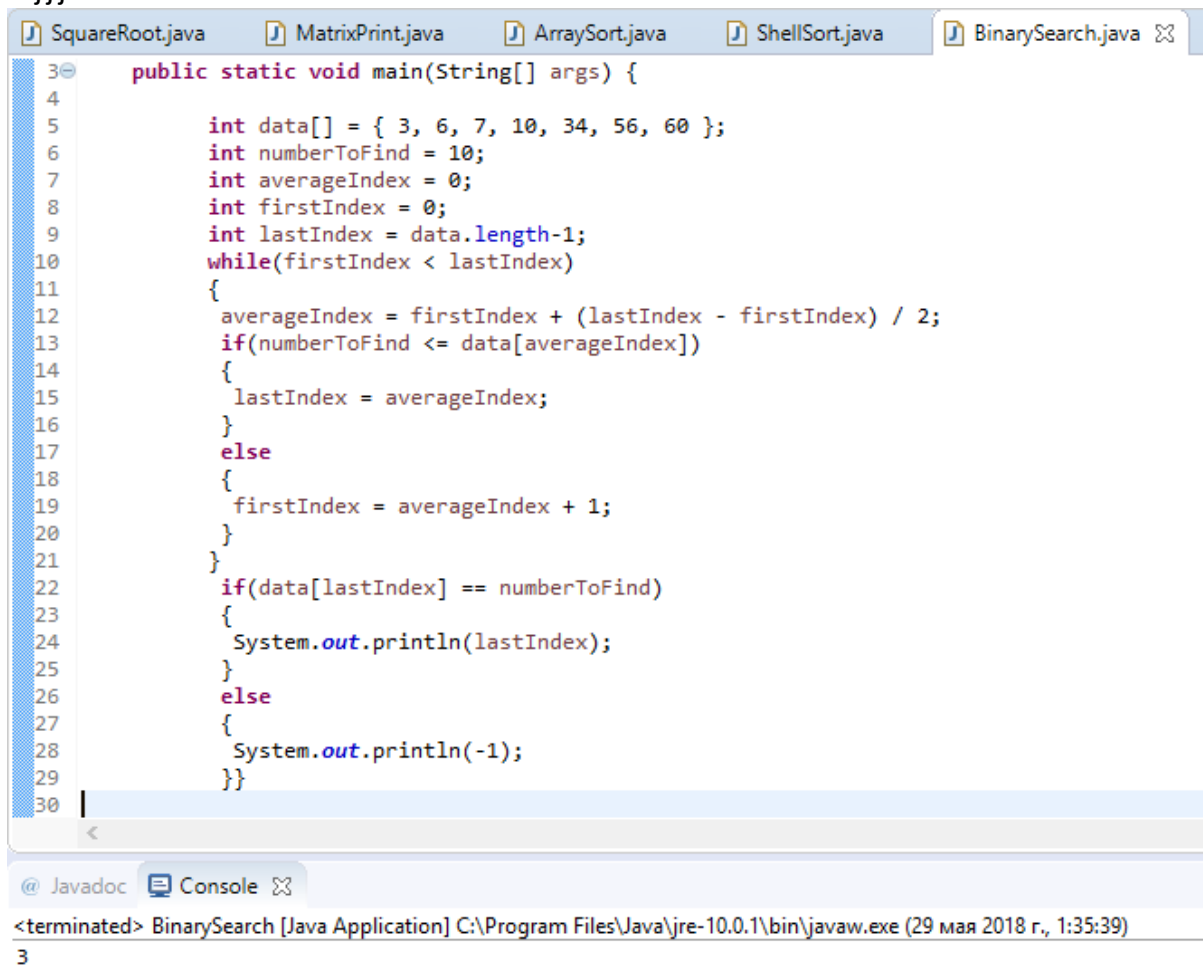
        int data[] = { 3, 6, 7, 10, 34, 56, 60 };
        int numberToFind = 10;
        int averageIndex = 0;
        int firstIndex = 0;
        int lastIndex = data.length-1;
        while(firstIndex < lastIndex)
        {
            averageIndex = firstIndex + (lastIndex - firstIndex) / 2;
            if(numberToFind <= data[averageIndex])
```



```

{
    lastIndex = averageIndex;
}
else
{
    firstIndex = averageIndex + 1;
}
}
if(data[lastIndex] == numberToFind)
{
    System.out.println(lastIndex);
}
else
{
    System.out.println(-1);
}
}
}

```



```

SquareRoot.java  MatrixPrint.java  ArraySort.java  ShellSort.java  BinarySearch.java
3  public static void main(String[] args) {
4
5      int data[] = { 3, 6, 7, 10, 34, 56, 60 };
6      int numberToFind = 10;
7      int averageIndex = 0;
8      int firstIndex = 0;
9      int lastIndex = data.length-1;
10     while(firstIndex < lastIndex)
11     {
12         averageIndex = firstIndex + (lastIndex - firstIndex) / 2;
13         if(numberToFind <= data[averageIndex])
14         {
15             lastIndex = averageIndex;
16         }
17         else
18         {
19             firstIndex = averageIndex + 1;
20         }
21     }
22     if(data[lastIndex] == numberToFind)
23     {
24         System.out.println(lastIndex);
25     }
26     else
27     {
28         System.out.println(-1);
29     }
30 }

```

@ Javadoc Console

<terminated> BinarySearch [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (29 мая 2018 г., 1:35:39)

3