

Please fill in your Student Number and Name.

Student Number : _____

Name: _____

Student Number: _____

University of Cape Town ~ Department of Computer Science

Computer Science 1015F ~ 2009

Supplementary Test 3

Question	Max	Mark	Internal	External
1	7			
2	13			
3	10			
TOTAL	30			

Marks : 30

Time : 40 minutes

Instructions:

- a) Answer all questions.
- b) Write your answers in the space provided.
- c) Show all calculations where applicable.

Question 1 [7]

Write Java code for the following - assume all this code is located within a single method:

- a) Set a 1-dimensional array called “val” to the following values 3, 7, 2, -1, -2, 6, 8, 9 [1]

```
int val[] = {3, 7, 2, -1, -2, 6, 8, 9};
```

- b) Find and print the largest value [2]

```
int large = val[0];
```

```
for (int i = 0; i < val.length; i++) // 1 mark
```

```
if (val[i] > large) large = val[i]; // 1 mark
```

```
System.out.println (“Largest = ” + large);
```

- c) Find and print how many elements have this largest value [2]

```
int no = 0;
```

```
for (int i = 0; i < val.length; i++) // 1 mark
```

```
if (val[i] == large) no++; // 1 mark
```

```
System.out.println (“Number = “ + no);
```

- d) Print out (on one line) every third value in the original array. (for this example: 3 -1 8) [2]

```
for (int i = 0; i < val.length; i += 3) // 1 mark
```

```
System.out.print (val[i]+ “ “); // 1 mark
```

```
System.out.println ();
```

Question 2 [13]

Write a Java code that uses a 1-dimensional array called “val” that contains the following values (0,5,3,-1,-2,0,3,-6). Assume this array has been created for you.

a) Write a loop that processes each value in the array by the following formula: [5]

- i. all zeros have 3 subtracted from them,
- ii. all negatives are multiplied by 4,
- iii. all positives swapped to negatives,

and prints the final values on 1 line. i.e. 0 5 3 -1 -2 0 3 -6 becomes -3 -5 -3 -4 -8 -3 -3 -24

```
int val [] = {0,5,3,-1,-2,0,3,-6}; //there is no mark for this part
for (int row = 0; row < val.length; row++) // 1 mark
{
    if (val [row] == 0) val [row] = val [row] - 3; // 1 mark
    else if (val [row] > 0) val [row] = -val [row]; // 1 mark
    else val [row] = val [row] = 4 * val[row]; // 1 mark
    System.out.println (val[row]); // 1 mark
}
System.out.println ();
```

b) Write Java code that prints out these values in the opposite order i.e. -24 -3 -3 -8 -4 -3 -5 -3 [2]

```
for (int i = 0; i < val.length, i++) // 1 mark
    System.out.print (val[val.length - 1 - i]); // 1 mark
OR
for (int i = val.length - 1; i >= 0; i--) // 1 mark
    System.out.print (val[i]); // 1 mark
OR
```

another similar solution... - 1 mark for any error

c) Write Java code to set the elements of a 2-dimensional array to the values indicated below. Two loops must be used sensibly and no value may be read in. Define all variables used. The code should work for any square array. [6]

-1	1	2	3	4	5
2	-1	2	3	4	5
3	3	-1	3	4	5
4	4	4	-1	4	5
5	5	5	5	-1	5
6	6	6	6	6	-1

```

public static void main (String [ ] args)
{ int max = 6;

}
int[ ][ ] x = new int[max][max];           // 1 mark
for (int row = 0; row < max; row++)       // 1 mark
{
    for (int col = 0; col < max; col++)    // 1 mark
    {
        if (row == col) x[row][col] = -1; // 1 mark
        else if (col > row) x[row][col] = col; // 1 mark
        else x[row][col] = row + 1;       // 1 mark
    }
}

```

watch-out for other alternative solutions students might give.

Question 3 [10]

- a) You are given the class “square” below where each side of the square is the same length. Write a derived class called “triangle” . “triangle” is the same as “square” except that each of the 3 sides has a different length. [10]

Use the principles of inheritance in your solution and rewrite each of the methods.

```
public class square
{
    protected int sidel;

    public square( )
    {
        sidel = 0;
    }

    public square(int s )
    {
        sidel = s;
    }

    public int perimeter( )
    {
        return 4 * sidel;
    }

    public String toString( )
    {
        return "Side 1 =" + sidel;
    }
}
```

```

public class triangle extends square
                                                                    1
{
    protected int side2, side3;
                                                                    1
    public triangle()
    {
        super();
                                                                    1
        side 2 = 0; side 3 =0}
                                                                    1

    public triangle(int s1, int s2, int s3 )
                                                                    1
    {
        super(s1);
                                                                    1
        side 2 = s2; side3 = s3;}
                                                                    1

    public int perimeter()
    {
        return side 1 + side2 + side3;}
                                                                    1

    public String toString()
    {
        return super.toString()
                                                                    1
        + "Side 2 =" + side 2 + "Side 3 =" + side3;}
                                                                    1
    }
}

```