

University of Cape Town
Department of Computer Science

Computer Science CSC115F

Supplementary Exam

-
- Answer all questions.
 - All questions that refer to elements of programming make reference to the Java programming language as studied in class.
 - Good luck !

Marks: 25

- Approximate marks per question are shown in brackets

Time: some minutes

- The use of calculators is permitted

NAME:

| | |
|---------|----------|
| Surname | Initials |
| | |

STUDENT NO: **COURSE CODE:**

This paper consists of 2 questions and 6 pages (including this cover page).

| Mark Allocation | | | | | | | |
|---------------------------|-------|----------|----------|---------------------------|-------|----------|----------|
| Quest | Marks | Internal | External | Quest | Marks | Internal | External |
| 1 | [10] | | | 2 | [15] | | |
| Total | | | | Total | | | |
| Grand Total | | | | | | | |
| Final Mark | | | | | | | |
| Internal Examiner: | | | | External Examiner: | | | |

Section 1. Basic Java Concepts

Question 1. [10 marks]

Study the following program and answer the questions that follow.

```
public class someprogram
{
    public static void main (String [] args)
        throws java.io.IOException
    {
        int a = Keyboard.readInt ("Enter a number: ");
        int b = 0;

        while ( a != 0)
        {
            int digit = a % 10;
            a = a / 10;
            b = (b * 10) + digit;
        }

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

a) What is a **method**? [2]

named sequence of statements that operate on an object

b) Is *digit* an instance variable or a local variable? Briefly explain why you believe this is so. [2]

local variable [1]
it is defined within a method. [1]

c) What is the output of the program if the input is "123"? In general, what does this program do? [2]

321
it reverses an integer.

d) The program will not work for numbers of 12 digits. How can it be modified to allow for this? [2]

change all data types to long [1] and use readLong [1]

e) Assuming you want to use statement coverage as a testing approach, provide a minimal set of test values to be used as input. [2]

123 [2]

Section 2. Problem Solving

Question 2. [15 marks]

- a) Complete the following program to draw an inverted right-handed right-angle triangle of height *height* on the screen in text mode, similar to the one depicted: [7]

```
****
***
**
*

public class tri
{
    public static void main ( String [] args )
        throws java.io.IOException
    {
        int height = Keyboard.readInt("Enter height: ");

        // write your code here

    }
}
```

```

public class tri
{
    public static void main ( String [] args )
        throws java.io.IOException
    {
        int height = Keyboard.readInt("Enter height: ");

        for ( int i=1; i<=height; i++ ) [2]
        {
            for ( int space=1; space<=(i-1); space++ ) [2]
                System.out.print ( " ");
            for ( int star=1; star<=(height-i+1); star++ ) [2]
                System.out.print ("*");
            System.out.println (); [1]
        }
    }
}

```

- b) Write a method **calcChange** to calculate the minimum number of each coin needed to sum up to a given amount. For example, the change for 41c is 2x20c and 1x1c, instead of 7x5c and 3x2c. Use the variables already defined to store the numbers of each coin. Assume the largest denomination is 50c. [8]

```
public class change
{
    public static void main ( String [] args )
    {
        changeCalc s = new changeCalc ();
        s.calcChange (10);
        s.calcChange (26);
        s.calcChange (74);
    }
}

class changeCalc
{
    public void calcChange ( int amount )
    {
        int c50, c20, c10, c5, c2, c1;

        // write your code here

        System.out.println ("50c:" + c50 + " 20c:" + c20 +
            " 10c:" + c10 + " 5c:" + c5 +
            " 2c:" + c2 + " 1c:" + c1);
    }
}
```

```
public void calcChange ( int amount )
{
    int c50, c20, c10, c5, c2, c1;

    c50 = amount / 50;
    amount = amount % 50;
    c20 = amount / 20;
    amount = amount % 20;
    c10 = amount / 10;
    amount = amount % 10;
    c5 = amount / 5;
    amount = amount % 5;
    c2 = amount / 2;
    amount = amount % 2;
    c1 = amount;

    System.out.println ("50c:" + c50 +
        " 20c:" + c20 +
        " 10c:" + c10 +
        " 5c:" + c5 +
        " 2c:" + c2 +
        " 1c:" + c1);
}
```