

Please fill in your Student Number and, optionally, Name.

Student Number : _____

Name : _____

For Official Use

Mark : _____

Marker : _____

University of Cape Town ~ Department of Computer Science

Computer Science 1015F ~ 2008

Theory Test 2A

Question	Mark	Marker

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: Boolean Expressions [8 marks]

a) Identify the results of the following expressions. The result will be either true or false. Assume variable $z = 5$.

1. $z > 3 \ \&\& \ z \geq 6$ [1/2 mark]
.....[True] or [False]
2. $z > 3 \ \&\& \ z < 20$ [1/2 mark]
.....[True] or [False]
3. $z \geq 0 \ \|\| \ z < 2$ [1/2 mark]
.....[True] or [False]
4. $z > 0 \ \&\& \ z < 5$ [1/2 mark]
.....[True] or [False]
5. $z < 7 \ \&\& \ z == 2$ [1/2 mark]
.....[True] or [False]
6. $z > 6 \ \|\| \ z == 5$ [1/2 mark]
.....[True] or [False]
7. $z < 3 \ \|\| \ z > 4$ [1/2 mark]
.....[True] or [False]
8. $z > 3 \ \&\& \ z < 0$ [1/2 mark]
.....[True] or [False]
9. $z \geq 5 \ \|\| \ z < 0$ [1/2 mark]
.....[True] or [False]

b) Rewrite the following switch statement as nested `if-else` statements.

```
switch(choice)
{
    case 1: System.out.println("A");
            break;
    case 2:
    case 3: System.out.println("B");
            break;
    case 4: System.out.println("C");
            break;
    default: System.out.println("Z");
}
```

Write your code here

```
if (choice ==1) { [1 mark]
    System.out.println("A");
} else if (choice ==2 || choice == 3){ [3/2 mark]
    System.out.println("B");
} else if (choice == 4) { [1 mark]
    System.out.println("C");
} else { [1 mark]
    System.out.println("Z");
}
```

Question 2: Loops [6 marks]

For the following `for` loop, identify the number of times the loop executes given the different coding options for line 14

```
11 int y = -3;
12 for (int x= 0; x > y; x ++)
13 {
14     //insert code that alters the condition
15     if (x==11)
16         y=20;
17 }
18 //How many times did the loop execute?
```

- a) Line 14 `x++;`6 loops.....[2 marks]
.....
- b) Line 14 `x +=5;`2 loops [2 marks]
.....
- c) Line 14 `x -=2;`3 loops [2 marks]

Question 3: Methods [4 marks]

Given the following code

```
public class ClassA
{
    method()
    {
        /*
        Variable declarations and other code is here
        */
        if (problem) //no point in continuing so
                    //we terminate the method
            return; //terminate the method
        /*
        More code in here
        */
        return usefulDataValue; //return some data value of
                                //a particular data type
    } //end of method
} //end of class declaration
```

- a) Identify the program errors in the code fragment. All of the variables needed have been declared and initialized. (Choose two).
1. The return data type for the method is not specified.
 2. The formal parameter list is not specified (should be declared as void).

3. An access modifier is not specified.
4. The method is attempting to return both a data type and a void type concurrently.
5. There should never be more than one return statement in any method

Your answer:

-
1. The return data type for the method is not specified [1mark]
 4. The method is attempting to return both a data type and a void type concurrently. [1mark]
- If total < 2 marks then 3. An access modifier is not specified. [1/2 mark]
-

[2 marks]

b) Write the syntax of a method that returns a value

```
public Type_Returned Method_Name (Parameter_List) { ....  
    return <expression that evaluates to Type_Returned>;}
```

[1 mark]

c) Write the syntax of a void method that performs some actions rather than returning a value

```
public void Method_Name (Parameter_List) { ....  
    return; //This is optional}
```

[1 mark]

Question 4: Classes and Objects [4 marks]

If a class is created called `Student` and one of the data fields (or instance variables) for the `Student` class is a reference to a `Date` object.

- a) What is the relationship between the Student object and the Date object?
 1. The `Date` object is a `Student` object.
 2. The `Date` object has a `Student` object.
 3. The `Student` object is a `Date` object.
 4. The `Student` object has a `Date` object.

Your answer:

-
4. The `Student` object has a `Date` object
-

[1 mark]

- b) Write a brief Java code to illustrate the above description (i.e. create the `Student` class and a public `Date` object such as `enrolmentDate`)

Write your code here

```
public class Student {
    public Date enrolmentDate = new Date();
    /* Other code here*/
}
```

[1 mark]

- c) Create an object of the `Student` class.

Write your code here

```
Student aStudent = new Student();
```

[1 mark]

- d) Get the enrolment date `enrolmentDate` of the object.

Write your code here

```
Date enrolDate = aStudent.enrolmentDate;
```

[1 mark]

Question 1:

- a) Consider the `Date` class below, and add a no-argument constructor, to the class that initializes the day, month, and year instance variables to 1 “January” 1999.

```
public class Date
{
    private String month;
    private int day;
    private int year; //a four digit number.

    public Date( )
    {
```

```
month = "January";
```

```
day = 1;
```

```
year = 1999;
```

```
}
```

```
}
```

- b) Consider the driver class below, and add a statement to create an object called `date1` using your no-argument constructor above.

```
public class ConstructorsDemo  
{
```

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

```
        Date date1 = new Date();
```

```
    }
```

```
}
```

- c) Consider the class `Date` above. Would it be legal to add method definitions with the following two method headings to the class `Date`? Motivate your answer.

```
public void setMonth(int newMonth)
```

```
public void setMonth(String newMonth)
```

```
Answer: Yes, it is legal [1 mark]
```

```
They have different signatures [1 mark]
```

```
OR
```

```
Overloading is used [1 mark]
```

- d) Can you use the `this` parameter in the definition of a static method?

```
Answer: No
```

e) What is a static variable?

Answer: A static variable belongs to the class as a whole [1 mark] OR

All objects of the class can read and change a static variable [1 mark]

Question 5:

a) Consider the Date class below, and add a no-argument constructor, to the class that initializes the day, month, and year instance variables to 1 “January” 1999.

```
public class Date
{
    private String month;
    private int day;
    private int year; //a four digit number.

    public Date( )
    {
```

month = "January";

day = 1;

year = 1999;

}

}

f) Consider the driver class below, and add a statement to create an object called date1 using your no-argument constructor above.

```
public class ConstructorsDemo
{
```

```
public static void main (String args[])
{
    Date date1 = new Date();

}
}
```

g) Consider the class Date above. Would it be legal to add method definitions with the following two method headings to the class Date? Motivate your answer.

```
public void setMonth(int newMonth)
public void setMonth(String newMonth)
```

Answer: Yes, it is legal [1 mark]
They have different signatures [1 mark]
OR
Overloading is used [1 mark]

h) Can you use the this parameter in the definition of a static method?

Answer: No

i) What is a static variable?

Answer: A static variable belongs to the class as a whole [1 mark] OR
All objects of the class can read and change a static variable [1 mark]