



The University of Fiji

School of Science and Technology

Department of IT and Computer Science

ITC131

Software Constructs and Tools

Semester I, 2010

FINAL EXAMINATION

Time Allowed: 3 hours + 10 minutes reading

Total Marks: 100

Instructions

- There are 2 sections. Section A consists of 20 multiple choice and 10 True/False questions while Section B consists of 6 programming and theory questions. Both are compulsory.
- Write your statements clearly in Section B to gain maximum marks.
- You may ask for extra sheets from the supervisors for your rough working.
- Do not forget to write your name and ID number on this page.
- This booklet contains 11 pages including this page.

Student Name:

Student Id:

GOOD LUCK!

Part I: Multiple Choice

[20 marks]

1. Which of the following is a reserved word in Java?
 - a. int
 - b. INT
 - c. Char
 - d. CHAR
2. Suppose `x` and `y` are `int` variables and `x = 32` and `y = 14`. What is the output of the following statement? The value of space character is 32.
`System.out.println(x + ' ' + y);`
 - a. "32 + 14"
 - b. 3214
 - c. 32 14
 - d. 78
3. In mixed-mode arithmetic with operand type's `int` and `double`, the result type is always:
 - a. int
 - b. double
 - c. Syntax error
 - d. none of the above
4. What is the output of the following Java code?

```
num = 1;
while(num < 10)
{
    System.out.print(num + " ");
    num = num + 2;
}
```

 - a. 2 4 6 8 10
 - b. 1 3 5 7 9
 - c. 1 2 3 4 5 6 7 8 9
 - d. 2 4 6 8 10
5. Which of the following are valid Java assignment statements? Assume that `i`, `x` and `n` are `double` variables?
 - a. `i += 5;`
 - b. `i + 2 = x;`
 - b. `x += 3;`
 - d. `n = 7 = x;`
6. What is the value of the expression `(int) (41.3/2)`?
 - a. 20.65
 - b. 20.5
 - b. 20
 - d. 21
7. Which of the following are valid Java identifiers?
 - a. MIX-UP
 - b. Stu_Id
 - c. one two
 - d. Hello!

8. Assume the following code is correctly inserted into a program: What is the output?

```
for (int i = 0; i <= 5 ; i++)  
{  
    System.out.print("*");  
    i = i + 1;  
}  
System.out.println();
```

- a. *
- b. *****
- b. ***
- d. None of the above

9. Suppose that the input is: 38 45 71 4 -1

What is the output of the following code? Assume all variables are properly declared.

```
sum = 0;  
num = console.nextInt();  
  
while (num != -1)  
{  
    sum = sum + num;  
    num = console.nextInt();  
}  
System.out.println("Sum = " +sum);
```

- a. Sum = 158
- b. Sum = 157
- b. Sum = 0
- c. no output

10. What is the output of the following code segment?

```
t = 10;  
if (t > 7)  
    System.out.print("Lautoka ");  
    System.out.print("Blues");
```

- a. Lautoka
- b. Blues
- b. Lautoka Blues
- d. nothing

11. Two methods are said to have **different formal parameter lists** if both methods have:

- a. A different number of formal parameters
- b. If the number of formal parameters is the same, then the data type of the formal parameters, in order you list, must differ in at least one position.
- c. Same number of formal parameters with the same data type.
- d. Both (a) and (b).

12. What is the output of the following Java program?

```
int j = 5;
if ((8 > 4) || (j++ == 7))
    System.out.println(j);
```

- a. 5
- b. 7
- b. 6
- c. None of the above

13. Which Java statement produces the following output?

```
ITC131
Final
```

- a. System.out.println("ITC131Final");
- b. System.out.println("ITC131" + "Final");
- c. System.out.println("ITC131\nFinal");
- d. System.out.println("ITC131\n\nFinal");

14. Which of the following statements determines the absolute value of a number and assigns it to the variable value?

- a. value = abs(number);
- b. value = Math. abs(number);
- c. number = abs(value);
- d. number = Math. abs(value);

15. Joining Strings with a '+' is called _____.

- a. Chaining
- b. parsing.
- c. Linking
- d. concatenation

16. A Boolean variable can hold _____.

- a. any character
- b. any whole number
- c. any decimal number
- d. the value true or false

17. You must always include _____ in a for loop's parentheses.

- a. two semicolons
- b. three semicolons
- c. two commas
- d. three commas

18. The switch argument within a switch structure requires a (n) _____.

- a. integer value
- b. character value
- c. double value
- d. integer or character value

19. Which of the following evaluates to TRUE if A has the value 8 and B has a value 6?

- a. A >= 8 && B > 6
- b. A > 8 && B > 6
- c. A < 10 && B <= 6
- d. A > 8 && B = 0

20. Which of the following method headings are valid?

- a. public static add (int a, int b)
- b. public static int Add (char x)
- c. public static char Add (int a, b)
- d. public static double add

Part II: Mark the following statements as true or false.

[10 marks]

- a. Bytecode is the machine language of the JVM.
- b. The first step in the problem-solving process is to analyze the problem.
- c. Suppose $a = 7$. After the statement $++a$; executes, the value of a is still 7 because the value of the expression is not saved in another variable.
- d. The class `JOptionPane` is contained in the package `javax.swing`.
- e. In a one-way selection, if a semicolon is placed after the expression (condition) in an if statement, the expression in the if statement is always true.
- f. In Java, both `!` and `!=` are logical operators.
- g. In a counter-controlled while loop, it is not necessary to initialize the loop control variable.
- h. When a while loop terminates, the control first goes back to the statement just before the while statement, and then the control goes to the statement immediately following the while loop.
- i. A value- returning method returns only integer values.
- j. A class can have more than one constructor.

Section B Short Answer Question

(70 Marks)

Question 1

[2 + 2 + 2 = 6 Marks]

a. Translate the following to base 10.

a. 1110

b. 11101

b. What are the advantages of problem analysis and algorithm design over directly coding a program in a high-level language?

c. Given the radius, in inches, and the price of a pizza, design an algorithm and write the pseudocode to find the price of the pizza per square inch.

Question 2

[20 Marks]

Consider the following program segment:

```
//import classes
```

```
public class Exercise2
{
    public static void main(String[] args)
    {
        //variable declarations
        //executable statements
    }
}
```

- a) Write a Java statement that imports the class `Scanner`. [1]
- b) Write a Java statement that declares `console` to be a `Scanner` object for inputting data from the standard input device. [2]
- c) Write Java statements that declare and initialize the following named constants: `SECRET` of the type `int` initialized to 11, and `RATE` of the type `double` initialized to 12.50. [2]
- d) Write Java statements that declare the following variables: `num1`, `num2`, and `newNum` of the type `int`; `name` of the type `String`; and `hoursWorked` and `wages` of the type `double`. [3]
- e) Write Java statements that prompt the user to input two integers and store the first number in `num1` and the second number in `num2`. [2]
- f) Write Java statements that outputs the values of `num1` and `num2`, indicating which is `num1` and which is `num2`. For example, if `num1` is 8 and `num2` is 5, then the output is:
The value of `num1` = 8 and the value of `num2` = 5. [1]
- g) Write a Java statement that multiplies the value of `num1` by 2, adds the value of `num2` to it, and then stores the result in `newNum`. Then write a Java statement that outputs the value of `newNum`. [2]
- h) Write a Java statement that updates the value of `newNum` by adding the value of the named constant `SECRET`. Then write a Java statement that outputs the value of `newNum` with an appropriate message. [2]
- i) Write Java statements that prompt the user to enter a person's last name and then store the last name into variable `name`. [2]
- j) Write Java statements that prompt the user to enter a decimal number between 0 and 70 and then store the number entered into `hoursWorked`. [2]

- k) Write a Java statement that multiplies the value of the named constant RATE with the value of hoursWorked, and then stores the result into the variable wages. [1]

Question 3

[4 + 2 + 1 + 2 = 9 Marks]

- a. The following program has syntax errors. Correct them. On each successive line, assume that any preceding error has been corrected.

```
public class Exercise3
{
    static final char BLANK = ' ';
    static final int ONE = 5;

    public static void main(String [] arg)
    {
        int a, b, cc;

        a = one + 5;
        b = a + BLANK;
        cc := a + ONE * 2;
        a + cc = b;
        ONE = b + cc;
        System.out.println ("a = " + a + ", b = " + b + ",
                               cc = " + cc);
    }
}
```

- b. Write a Java statement that creates the output dialog box shown in Figure E2

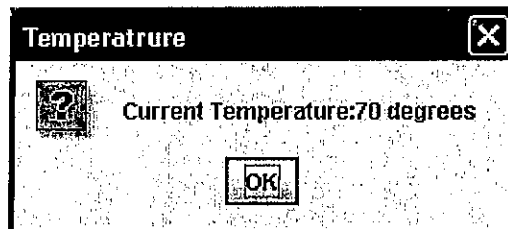


Figure E2

- c. What is the output of the following Java statement?

$3 * 7 - 6 + 2 * 5 / 4 + 6$

- d. Which of the following variable declaration are correct? If a variable declaration is not correct, give the reason(s) and provide the correct variable declaration.

```
n = 12;
char letter = ;
int one = 2, two;
double x, y, z;
```

Question 4

[2+ 1 + 6 + 5 = 14 Marks]

- a. How does a variable of a primitive type differ from a reference variable?
- b. Suppose that `str` is a `String` variable. Write a Java statement that uses the operator `new` to instantiate the object `str` and assign the string "Java Programming" to `str`.
- c. Suppose that you have the following statements:

```
String str;  
str = "Java programming: from problem analysis to program  
design";
```

What is the value of the following expressions?

- i. `str.indexOf("analysis")`
- ii. `str.substring(5,16)`
- iii. `str.startsWith("Java")`
- iv. `str.charAt(15)`
- v. `str.endsWith(".")`
- vi. `str.length()`

- d. Consider the following method headings:

```
public static int test (int x, char ch, double d, int y)  
public static double two (double d1, double d2)  
public static char three (int x, int y, char ch, double d)
```

Answer the following questions.

- i. How many parameters does the method `test` have? What is the type of the method `test`?
- ii. How many parameters does method `three` have? What is the type of the method `three`?
- iii. How many actual parameters are needed to call the method `test`?
What is the type of each parameter, and in what order should you use these parameters in a call to the method `test`?
- iv. Write a Java statement that prints the value returned by the method `test` with the actual parameters 5, 5, 7.3 and 'z'.
- v. Write a Java statements that prints the value returned by method `two` with the actual parameters 17.5 and 18.3, respectively.

Question 5**[2+ 2+ 2 + 2 = 8 Marks]**

a. What is the output of the following program segments?

```
i.    if ( 6 > 2 * 5)
        System.out.print("Hello");
        System.out.print(" There");

ii.   if (5 < 3)
        System.out.println ("*");
    else if ( 7 == 8)
        System.out.println ("&");
    else
        System.out.println ("$");
```

b. Suppose the input is 3. What is the value of beta after the following Java code executes? (Assume that all variables are declared properly.)

```
beta = console.nextInt()

switch (beta)
{
case 3:
    beta = beta + 3
case 1:
    beta++;
    break;
case 5:
    beta = beta + 5;
case 4:
    beta= beta + 4;
}
```

c. What is the output of the following program?

```
public class WhatIsTheOutput
{
    public static void main (String [] args)
    {
        int x, y, z;
        x = 4;
        y = 5;
        z = y + 6;
        while ( ( (z - x) % 4) != 0)
        {
            System.out.print (z + " ");
            z = z + 7;
        }
        System.out.println ( );
    }
}
```

- d. Given that the following code is correctly inserted into a program, describe the content and form of its entire output.

```
int j = 2;
for (int i = 0; i <= 5; i++)
{
    System.out.print (j + " ");
    j = 2 * j + 3;
}
System.out.println ( );
```

Question 6

[2+ 2+ 2 + 7 = 13 Marks]

- a. What is the output of the following Java program?

```
import static java.lang.Math.*;

public class Exercise2
{
    public static void main (String [ ] args)
    {
        for (int counter = 1; counter <= 100;
counter++)
            if (pow (floor(sqrt (counter)), 2) ==
counter)
                System.out.print (counter + " ");
                System.out.println ( );
    }
}
```

- b. Consider the following method:

```
public static int secret (int one)
{
    int prod = 1;
    for (int i = 1; i <= 3; i++)
        prod = prod * one;
    return prod;
}
```

- i. What is the output of the following Java statements?

a. `System.out.println (secret (5));`

b. `System.out.println (2 * secret (6));`

- ii. What does the method secret do?

c. In the program fragment shown, identify the following items: method heading, method body, method definition, formal parameters, actual parameters, method call, and local variables.

```
public class question5 //Line 1
{ //Line 2
    public static void main (string args[]) //Line 3
    { //Line 4
        int x; //Line 5
        double y; //Line 6
        char z; //Line 7
        //... //Line 8
        hello(x,y,z); //Line 9
        //... //Line 10
        hello(x+2, y-3.5, 's'); //Line 11
        //... //Line 12
    } //Line 13
    public static void hello(int first, double //Line 14
                             second, char ch) //Line 15
    { //Line 16
        int num; //Line 17
        double y; //Line 18
        //... //Line 19
    } //Line 20
} //Line 21
```

5

5