

# THE UNIVERSITY OF AUCKLAND

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## SECOND SEMESTER, 2004

### COMPUTER SCIENCE

### Principles of Programming

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### TEST – Question Sheet

(Time allowed: 75 MINUTES)

#### INSTRUCTIONS:

- Attempt **ALL** questions
- Write all answers in the Answer Sheet provided
- Calculators are **NOT** permitted

#### **Multi-choice Questions (60 marks – 2 marks each)**

*For each of the following questions, please write your answer on the answer sheet. Write only the letter corresponding to the answer you have chosen. Write the appropriate letter in CAPITALS, using pen.*

1. Choose the variable declaration from the items listed below:

- (a) `int max;`
- (b) `a = 3;`
- (c) `Math.max(a,b)`
- (d) `"Max is "`
- (e) `"Max is " + max`

2. What output is produced by the following code?

```
int a = 0;
int b = 7;

a = b;
b = a;

System.out.println(a + b);
```

Choose the correct output from the list below:

- (a) 0
- (b) 00
- (c) 7
- (d) 14
- (e) 77

3. What output is produced by the following code?

```
int a = 1;
double b = 7.5;

a = (int)b;
b = (double)a;

System.out.println(a + b);
```

Choose the correct output from the list below:

- (a) 2.0
- (b) 8.0
- (c) 8.5
- (d) 14.0
- (e) 15.0

4. What output is produced by the following code?

```
System.out.println(21 / 2 * 2.0);
```

Choose the correct output from the list below:

- (a) 5.0
- (b) 5.25
- (c) 20.0
- (d) 21.0
- (e) 22.0

5. What output is produced by the following code?

```
System.out.println(3.0 / 2 * 3);
```

Choose the correct output from the list below:

- (a) 0.0
- (b) 0.5
- (c) 4.0
- (d) 4.5
- (e) 9.0

6. What output is produced by the following code?

```
System.out.println(3.0 * 3 / 2);
```

Choose the correct output from the list below:

- (a) 0.0
- (b) 1.5
- (c) 3.0
- (d) 4.0
- (e) 4.5

7. What output is produced by the following code?

```
System.out.println("\\\\"+"\\");
```

Choose the correct output from the list below:

- (a) \\\"+\\
- (b) \\\
- (c) \"
- (d) \"+\\
- (e) The statement contains a syntax error and will not compile, so no output is produced.

8. What output is produced by the following code?

```
System.out.println(23%5);
```

Choose the correct output from the list below:

- (a) 3
- (b) 2
- (c) 4
- (d) 5
- (e) 4.6

9. What output is produced by the following code?

```
System.out.println(5 % 3 + 3 % 5);
```

Choose the correct output from the list below:

- (a) 2
- (b) 1
- (c) 5
- (d) 0
- (e) 3

10. What output is produced by the following code?

```
System.out.println(2.0 + 3 + "1" + 2.0 + 3);
```

Choose the correct output from the list below:

- (a) 5.015.0
- (b) 11.0
- (c) 2.0315.0
- (d) 5.012.03
- (e) 2.0312.03

11. What output is produced by the following code?

```
int i = 4;  
i += 3;  
i -= 1;  
System.out.println(i);
```

Choose the correct output from the list below:

- (a) 1
  - (b) 3
  - (c) 5
  - (d) 6
  - (e) The code contains a syntax error and will not compile, so no output is produced.
12. List the identifiers in the following code:

```
private double calculateCircumference(int radius){  
    final double PI = 3.1415927;  
    return 2 * PI * radius;  
}
```

Choose the correct answer from the list below:

- (a) private, double, int, final, return
  - (b) double, int
  - (c) private double calculateCircumference(int radius)
  - (d) 3.1415927, 2
  - (e) calculateCircumference, radius, PI
13. List the literal values in the following code:

```
private double calculateCircumference(int radius){  
    final double PI = 3.1415927;  
    return 2 * PI * radius;  
}
```

Choose the most appropriate answer from those given below:

- (a) private, double, int, final, return
- (b) double, int
- (c) private double calculateCircumference(int radius)
- (d) 3.1415927, 2
- (e) calculateCircumference, radius, PI

14. What output is produced by the following code?

```
String s = "Hello World";  
s = s.substring(3,5) + s.substring(6,8);  
System.out.println(s);
```

Choose the correct output from the list below:

- (a) ll W
- (b) llo Wo
- (c) loor
- (d) lo Wor
- (e) loWo

15. What output is produced by the following code?

```
String s = "Hello World";  
System.out.println(s.indexOf("le"));
```

Choose the correct output from the list below:

- (a) -1
- (b) 0
- (c) 1
- (d) 2
- (e) 3

16. What output is produced by the following code?

```
String s = "Hello World";  
System.out.println(s.indexOf("o"));
```

Choose the correct output from the list below:

- (a) 4
- (b) 7
- (c) 5
- (d) 8
- (e) 5 8

17. Given two non-negative integers  $a$  and  $b$  (where  $b$  is greater than  $a$ ) and a String  $s$ , what is the number of characters in the expression  $s.substring(a,b)$ ?

Choose the correct answer from the list below:

- (a)  $b$
- (b)  $b - 1$
- (c)  $b - a - 1$
- (d)  $b - a$
- (e)  $b - a + 1$

18. What output is produced by the following code?

```
String str1 = "abc";  
String str2 = "def";  
String str3 = str1.concat(str2);  
  
str1.concat(str2);  
System.out.println(str1);
```

Choose the correct output from the list below:

- (a) abc
- (b) def
- (c) abcdef
- (d) abcdefdef
- (e) abcdefabcdef

19. Assuming that we are following the Java code conventions, what kind of thing does the following identifier represent?

BOX

Choose the correct answer from the list below:

- (a) class
- (b) constant
- (c) method
- (d) variable
- (e) none of the above

20. Assuming that we are following the Java code conventions, what kind of thing does the following identifier represent?

Box

Choose the correct answer from the list below:

- (a) class
- (b) constant
- (c) method
- (d) variable
- (e) none of the above

21. The following code needs to be completed by choosing an answer to go in the box.

```
 number;  
number = Keyboard.readInput();  
number = number + 1.0;  
System.out.println(number);
```

Choose the correct answer from the list below:

- (a) int
  - (b) double
  - (c) char
  - (d) boolean
  - (e) String
22. The English sentence "If a is less than either b or c, then print 'a' otherwise print 'b'" could be translated into which of the following Java statements?

- (a) 

```
if (a < b || c)  
    System.out.println('a');  
else  
    System.out.println('b');
```
- (b) 

```
if (a < b ? a < c)  
    System.out.println('a');  
else  
    System.out.println('b');
```
- (c) 

```
if (a < b && a < c)  
    System.out.println('a');  
else  
    System.out.println('b');
```
- (d) 

```
if (b > a || a < c)  
    System.out.println('a');  
else  
    System.out.println('b');
```
- (e) 

```
if (b || a : a || c)  
    System.out.println('a');  
else  
    System.out.println('b');
```

23. The English sentence "If both a and b are not equal to c or a is equal to b, then print 'a'" could be translated into which of the following Java statements?

- (a) 

```
if (a != c || b != c && a == b)  
    System.out.println('a');
```
- (b) 

```
if (a && b != c || a == b)  
    System.out.println('a');
```
- (c) 

```
if (!(a == c) && !(b == c) && a == b)  
    System.out.println('a');
```
- (d) 

```
if (!(a == c || b == c) || a == b)  
    System.out.println('a');
```
- (e) 

```
if (a != c || !(b == c) || a == b)  
    System.out.println('a');
```

24. The English sentence "If a is not greater than b and b is greater than c, then print 'b'" could be translated into which of the following Java statements?

- (a) 

```
if (!(a > b) && b > c)
    System.out.println('b');
```
- (b) 

```
if (a !> b && b > c)
    System.out.println('b');
```
- (c) 

```
if (a >! b && !(b <= c))
    System.out.println('b');
```
- (d) 

```
if (a <= b || b > c)
    System.out.println('b');
```
- (e) 

```
if (a <= b && !(b < c))
    System.out.println('b');
```

25. The English sentence "If a is not less than b, or b is not less than c, then print 'c'" could be translated into which of the following Java statements?

- (a) 

```
if (!(a < b && b < c))
    System.out.println('c');
```
- (b) 

```
if (!(a < b || b < c))
    System.out.println('c');
```
- (c) 

```
if (!(a < b) && !(a < b))
    System.out.println('c');
```
- (d) 

```
if (a >= b || b !< c)
    System.out.println('c');
```
- (e) 

```
if (a >= b >= c)
    System.out.println('c');
```

26. What output is produced by the following code?

```
char ch;
String test2 = "abcde";
String test = new String("abcde");
if(test.equals(test2)) {
    if(test == test2)
        ch = test.charAt(0);
    else
        ch = test.charAt(1);
} else {
    if(test == test2)
        ch = test.charAt(2);
    else
        ch = test.charAt(3);
}
System.out.println(ch);
```

Choose the correct output from the list below:

- (a) a
- (b) b
- (c) c
- (d) d



(e) e

27. What is the output of the following code?

```
String s1 = "abc";
String s2 = new String("abc");
if (s1 == s2)
    System.out.print(1);
else
    System.out.print(2);
if (s1.equals(s2))
    System.out.print(3);
else
    System.out.print(4);
```

Choose the correct output from the list below:

- (a) 13
- (b) 24
- (c) 14
- (d) 23
- (e) None of the above

28. A method is called in the following way:

```
char c = getLetter("Test", 3);
```

Choose the correct method header from the list below:

- (a) private String getLetter(String s)
- (b) private char getLetter(String s)
- (c) private void getLetter(String s, int i)
- (d) private String getLetter(String s, int i)
- (e) private char getLetter(String s, int i)

29. A method is called in the following way:

```
printOutput(3, 'H', "Hello");
```

Choose the correct method header from the list below:

- (a) private void printOutput(int i, String s, String t)
- (b) private void printOutput(String s, char c, int i)
- (c) private void printOutput(double d, char c, String s)
- (d) private String printOutput(int i, char c, char d)
- (e) private String printOutput(int i, String s, String t)

30. A leap year can be calculated in the following way: every year which is evenly divisible by 4 is a leap year, except that a year which is also divisible by 100 is not a leap year, unless it is divisible by 400, in which case it is a leap year after all! The code to calculate if a specified year is a leap year is included below. Choose the answer which will correctly complete the code.

```
boolean isLeapYear = false;
if (year % 400 == 0)
    isLeapYear = true;
else if (  )
    isLeapYear = true;
```

- (a) `year % 100 != 0 && year % 4 == 0`
- (b) `year % 100 == 0`
- (c) `year % 100 != 0`
- (d) `year % 4 == 0`
- (e) `year % 4 != 0`

**31. While loops (10 marks)**

Give the output when the `testWhile()` method shown below is executed.

```
private void testWhile(){
    int num1 = 0;
    int num2 = 1;

    while (num1 < num2) {
        System.out.println("num1: " + num1 + ", num2: " + num2);
        if (num1 >= 2)
            num1 = num1 + 5;

        num1++;
        num2 = num2 + 2;
    }

    System.out.println("num1: " + num1 + ", num2: " + num2);
}
```

Write the output on the Answer Sheet in the space provided.

**32. Loops (10 marks)**

The `printNums()` method prints a series of integers. This method is passed three `int` parameters.

`startNum` – the first number which is printed.

`decrease` – the amount by which each subsequent number in the series is decreased.

`lowerLimit` – the smallest possible number which can be printed.

For example, if the following three calls are made to the `printNums()` method:

```
printNums(30, 2, 21);
printNums(125, 5, 100);
printNums(24, 4, 12);
```

the output would be:

```
30 28 26 24 22  STOP
125 120 115 110 105 100  STOP
24 20 16 12  STOP
```

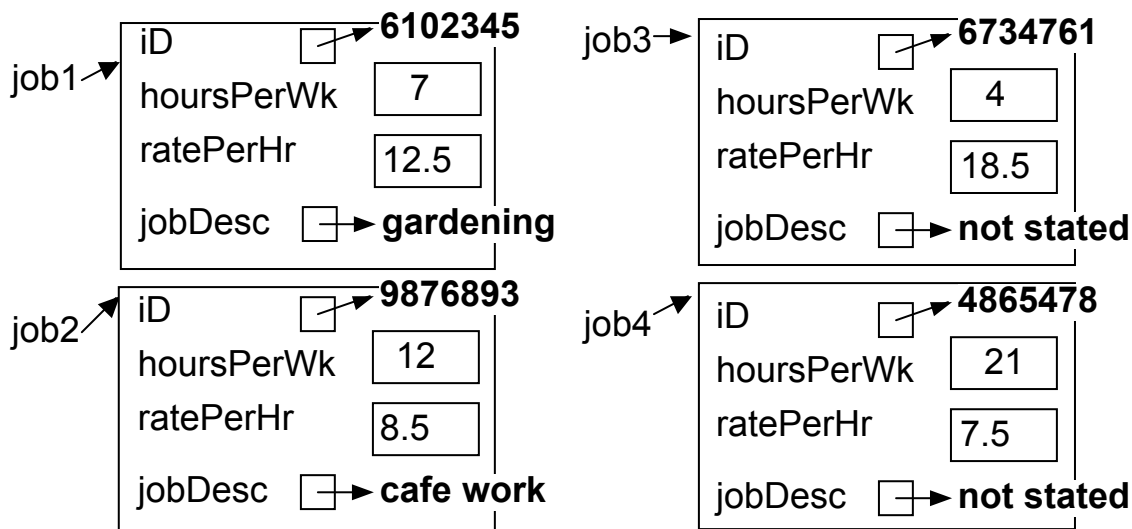
Complete the `printNums()` method shown in the Answer Sheet.

**33. Classes (8 marks)**

When the following code is compiled, 4 instances of the `StudentJob` class are created.

```
StudentJob job1, job2, job3, job4;
job1 = new StudentJob("6102345", 7, 12.5, "gardening");
job2 = new StudentJob("9876893", 12, 8.5, "cafe work");
job3 = new StudentJob("6734761", 4, 18.50);
job4 = new StudentJob("4865478", 21, 7.50);
```

In memory the 4 instances look like the diagram shown below.



Complete the `StudentJob` class definition contained in the Answer Sheet.

**Notes:**

You need to complete the definition of the instance variables.

You need to define two constructors.

- One constructor will take 4 parameters.
- The other constructor will take 3 parameters. (When defining this constructor think carefully about the default value which is assigned to the instance variable `jobDesc`.)

**Multi-choice Questions (8 marks)**

For each of the following questions, you must select **two** answers. Please write both answers in the appropriate places on the Answer Sheet. Write the CAPITAL letters corresponding to the answers you have chosen, using pen.

34. Two of the following are legal identifier names in Java (although they may not adhere to the normal code conventions, they are still legal Java syntax). Choose the two correct identifiers.

- (a) GST%
- (b) 3people
- (c) box43
- (d) double
- (e) \_name

(2 marks)

35. Given the following code, which of the assignment statements would compile?

```
int i = 3;
double d = 4.5;
String s = "3";
```

Choose two answers from the list below.

- (a) s = (String)d;
- (b) d = (double)s;
- (c) s = i;
- (d) d = i;
- (e) i = (int)d;

(2 marks)

36. When a retail outlet gives change, the smallest amount it can give is a 5 cent piece. They therefore need to round the change given (or the price) to the nearest multiple of 5. Assume that we have a total number of cents (stored as an integer value) and we want to round it to the nearest multiple of 5 (e.g. 18, 19, 20, 21 and 22 would be rounded to 20, while 23, 24, 25, 26 and 27 would be rounded to 25). The expressions below are supposed to round the value total to the nearest multiple of 5, however 2 of the 5 expressions are incorrect. Choose both incorrect expressions from the list below.

Choose the two **incorrect** expressions from the list below.

- (a) total - (total \* 2) % 10 / 2
- (b) (total + 2) - (total + 2) % 5
- (c) (total + 2) / 5 \* 5
- (d) (int)(Math.round((total \* 2) / 10.0) \* 5)
- (e) (int)(Math.round((total + 2) / 5.0) \* 5)

(4 marks)

**Multi-choice Question (4 marks)**

*For the following question, please write your answer on the answer sheet. Write only the letter corresponding to the answer you have chosen. Write the appropriate letter in CAPITALS, using pen.*

37. The following code is executed by calling the start method. What is the output?

```
private void first(){
    System.out.print("A");
    int a = 3;
}

private void second(int b){
    System.out.print("B");
    b = 7;
    int a = 4;
    first();
    System.out.print(a);
}

private void third(int a){
    System.out.print("D");
    a = 5;
    second(a);
    first();
    System.out.print(a);
}

public void start() {
    System.out.print("Start:");
    int b = 8;
    third(3);
    second(b);
    System.out.print(b);
    System.out.println(":Finish");
}
```

Choose the correct answer from the list below:

- (a) Start:DBA4A3BA47:Finish
- (b) Start:DBA3A3BA37:Finish
- (c) Start:DBABA8:Finish
- (d) Start:DBA4A5BA48:Finish
- (e) Start:DBAaAaBAab:Finish
- (f) Start:DBA3A5BA58:Finish