NATIONAL UNIVERSITY OF SINGAPORE

SCHOOL OF COMPUTING

TERM TEST
AY2008/2009 Semester 1

CS1101X/Y/Z — PROGRAMMING METHODOLOGY

4 October 2008   Time Allowed: **1 hour 15 minutes**

INSTRUCTIONS

1. This question paper contains **EIGHTEEN (18)** questions and comprises **EIGHT (8)** printed pages, including this page.

2. An **ANSWER SHEET** is provided for you to write the answers. It comprises **TWO (2)** printed pages.

3. Answer **ALL** questions within the space provided on the **Answer Sheet**.

4. Maximum score is **20 marks**.

5. This is an **OPEN BOOK** test.

6. Write legibly with a pen or pencil.

7. Calculators are allowed, but not electronic dictionaries, laptops, PDAs or other computing devices.

8. Submit only the **Answer Sheet** at the end of the test. You may keep the question paper.

9. Write your **MATRICULATION NUMBER** on the **Answer Sheet** using a **PEN**.

—— END OF INSTRUCTIONS ——

SECTION A (15 Multiple Choice Questions : 15 Marks)

Each question has one correct answer. Write your answer in the space provided on the **Answer Sheet**. 1 mark for each correct answer and no penalty for wrong answer.

1. Which of the following are **not** legal identifiers?

     i.   `NUMBER_OF_MEMBERS_2008`
     ii.   `#OfMembers2008`
     iii.   `$NumberOfMembers2008`
     iv.   `2008MembersNumber`

     A.   Only (iv).
     B.   Only (ii) and (iii).
     C.   Only (ii) and (iv).
     D.   Only (ii), (iii) and (iv).
     E.   All of (i), (ii), (iii) and (iv).

2. What is the value of variable **i** after execution of the following statement?

```
int i = 7/2 * 4 % 3 * 3;
```

     A.   0
     B.   3
     C.   5
     D.   6
     E.   9

3. Which of the following assignment statements is **not** valid?

     A.   `int i = (int) 0.987;`
     B.   `int j = 9.0;`
     C.   `double d = 9;`
     D.   `double e = (int) 9.87;`
     E.   `char c = (char) 98.7;`

4. Which of the following expressions is/are **false**?

     i.   `(3 < 2) || ("abc".charAt(1) == 'a')`
     ii.   `!(false) && (5/3 % 4 - 1 != 1)`
     iii.   `("NUS SOC".length() >= 7 && (int)(5.0/1.7) == 2)`

     A.   None of (i), (ii) and (iii) is false.
     B.   Only (i) is false.
     C.   Only (i) and (ii) are false.
     D.   Only (ii) and (iii) are false.
     E.   All of (i), (ii) and (iii) are false.

5. Two `int` variables `x` and `y` are declared and initialized with a value between 0 and 99 <u>inclusive</u>. Which of the following statements will interchange the values of `x` and `y`?

    i.   `x = y; y = x;`
    ii.   `x = y; y = x; x = y;`
    iii.   `x = ((x*100)+y)%100; y = ((x*100)+y)/100;`

    A.   None of (i), (ii) and (iii).
    B.   Only (i) .
    C.   Only (i) and (ii).
    D.   Only (ii) and (iii).
    E.   All of (i), (ii) and (iii).

6. Given the following program:

```java
import java.util.Scanner;

public class Scan
{
  public static void main(String[] args)
  {
    Scanner stdIn = new Scanner(System.in);

    System.out.println("Enter year of matriculation: ");
    String year = stdIn.next();

    System.out.println("Enter student's name: ");
    String name = stdIn.nextLine();

    System.out.println("Name - " + name + " - " + year);
  }
}
```

Assume that the user intends to input the following data:

    2008 <↵*Enter*>
    John Smith <↵*Enter*>

What happens when the program is run?

    A.   Program accepts both inputs, and it outputs:
          `Name - John Smith - 2008`
    B.   Program accepts both inputs, and it outputs:
          `Name - John - 2008`
    C.   Program accepts only first input, and it outputs:
          `Name -  - 2008`
    D.   Program accepts only second input, and it outputs:
          `Name - John Smith -`
    E.   Program causes run-time error due to mismatch of input type.

7. The following program determines if the input integer is even or not.

```
import java.util.Scanner;

public class IsEven
{
   public static void main(String[] args)
   {
      Scanner stdIn = new Scanner(System.in);
      int n = stdIn.nextInt();
      boolean isEven;

      // code to test whether n is even.

      System.out.println(n + " even? " + isEven);
   }
}
```

Which of the following codes can be used in place of the comment without causing any error?

```
i.    if (n%2 == 0)
      {
         isEven = true;
      }
      else
      {
         isEven = false;
      }
```

```
ii.   if (n%2 == 0)
      {
         isEven = true;
      }
      if (n%2 == 1)
      {
         isEven = false;
      }
```

```
iii.  switch (n%2)
      {
         case 0: isEven = true; break;
         case 1: isEven = false; break;
      }
```

    A.   None of (i), (ii) and (iii).
    B.   Only (i).
    C.   Only (i) and (ii).
    D.   Only (i) and (iii).
    E.   All of (i), (ii) and (iii).

8. What is the output of the following program fragment?

```
int a = 2;
int b = 8;
while (a < 7)
{
   a += 1;
   System.out.print(a + b + " ");
   b -= 1;
}
System.out.println();
```

    A.   38 47 56 65 74
    B.   28 37 46 55 64
    C.   11 11 11 11 11
    D.   11 12 13 14 15
    E.   Program cannot be run due to compilation error.

9. A Breakpoint has been set at line 14 of the following program using the DrJava debugger. What are the values of the variables given below when the Breakpoint is reached for the first time?

```
1  public class Parser
2  {
3     public static void main(String[] args)
4     {
5        String sentence = "this is a test ";
6        String token;
7        int start = 0;
8        int stop;
9
10       do
11       {
12          stop = sentence.indexOf(' ');
13          token = sentence.substring(start, stop);
14          sentence = sentence.substring(stop + 1);
15          System.out.println(token);
16       } while (!sentence.equals(""));
17    }
18 }
```

	stop	token	sentence
A.	3	"this"	"this is a test "
B.	4	"this"	"is a test "
C.	4	"this"	"this is a test "
D.	14	"test"	"this is a "
E.	13	"test"	"this is a test "

10. What is the output of the following program fragment?

```
int p = 1;
for (int i = 0; i < 10; i+=2)
{
    p += i;
    System.out.print(p + " ");
}
```

    A.   0 2 4 6 8
    B.   1 2 4 7 11 16 22 29 37 46
    C.   1 3 5 7 9
    D.   1 3 7 13 21
    E.   1 3 5 7 9 11

11. What is the value of variable `count` after execution of the `do..while` loop?

```
String str = "MissiSsippi";
int count = 0, i = 0;

do
{
    if ( str.charAt(i) == str.charAt(i+1) &&
         str.charAt(i+1) != str.charAt(i+2) )
    {
        count++;
    }
    i++;
} while (i < str.length() - 2);
```

    A.   0
    B.   1
    C.   2
    D.   3
    E.   A `StringIndexOutOfBoundsException` occurs.

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

```
char c = 'd';
Character.toUpperCase(c);
System.out.println("Is " + c + " lower case? " +
                   Character.isLowerCase(c));
```

    A.   Is c lower case? true
    B.   Is d lower case? true
    C.   Is d lower case? false
    D.   Is D lower case? true
    E.   Is D lower case? false

13. What is the output of the following statement?

```
System.out.printf("%-2.2f\n", Math.pow(2,3));
```

    A. 8
    B. 8.
    C. -8
    D. 8.00
    E. -8.00

14. What is the output of the following program fragment?

```
int[] array = {1,2,3,4,5};
int j = 0;

for (int i = 0; i < 10; i++)
{
    System.out.print(array[j]);
    j = (j+2) % array.length;
}
```

    A. 12345
    B. 1234512345
    C. 1351351351
    D. 13524
    E. 1352413524

15. Study the following program fragment.

```
String s1 = "ABC";
String s2;
char[] c1 = {'a','b','c'};
char[] c2 = new char[c1.length];

s2 = s1;
c2 = c1;

s2 = s2.substring(0,1) + "Y" + s2.substring(2);
c2[1] = 'y';
```

What are the contents of the strings and arrays?

	s1	s2	c1	c2
A.	"ABC"	"ABC"	{'a','b','c'}	{'a','b','c'}
B.	"ABC"	"AYC"	{'a','b','c'}	{'a','y','c'}
C.	"ABC"	"AYC"	{'a','y','c'}	{'a','y','c'}
D.	"AYC"	"AYC"	{'a','b','c'}	{'a','y','c'}
E.	"AYC"	"AYC"	{'a','y','c'}	{'a','y','c'}

Section B (3 Questions, 5 Marks)

Write your answer in the space provided on the **Answer Sheet**.

16. Complete the Java program `Pattern` given in the Answer Sheet so that given a positive integer input, a stylized pattern is printed accordingly as shown in the sample runs below. **[2 Marks]**

```
Enter count: 4
#-#--#---#----
```

```
Enter count: 7
#-#--#---#----#-----#------#-------
```

17. Write down the output of the following program fragment. **[2 Marks]**

```java
int[] array = {1,2,3,4,5};

for (int i = 0; i < array.length; i++)
{
   for (int j = 0; j < i; j++)
   {
      array[i] += array[j];
   }
   System.out.print(array[i] + " ");
}
```

18. Given an `int` variable `p` containing an odd integer greater than one, complete the following Java expression to generate a **random odd number** `oddNum` between `1` and `p` inclusive.

    (Hint: every positive odd number *s* can be expressed as $2r + 1$ where $r \geq 0$)

    [1 Mark]

```
int oddNum =
```

Write your answer in the Answer Sheet.

———— **END OF PAPER** ————