

CSIS 0911B Computer Concepts and Programming
for non-Engineering students (Java)

Assignment 2

Assigned 2:00pm Oct 9, 2000; dead 2:00pm Oct 30, 2000.
Assignment box: R5, lift lobby, 3/F Chow Yei Ching building

Submission: Write down your answers to the questions. Save your program in section 3 in a floppy diskette. Also print a copy of your program. Put all the above into an envelope and put it into assignment box R5. **Remember to write down your name, university ID and your curriculum** on the envelope. Send a mail to the tutor (cpng@csis.hku.hk) indicating that you have submitted an assignment.

Section 1: Short Questions

1. Choose all that applies. Suppose you want to write a complicated application. If you make use of top-down design and early testing, the first time you compile and test the program,:
 - (a) the program can read the input.
 - (b) the program can compute the output.
 - (c) the program prints out some FIXME messages.
 - (d) the program can do none of the above.

2. What are the two most serious problems in the following program?

```
import chapman.io.*;
public class Hello {
    public static void main(String[] args) {
        System.out.print("What is your name? ");
        StdIn in = new StdIn();
        String name = in.readString();
        int i = 0;
        while (i<5) {
            System.out.println("Hello, " + name + "!");
            ++i;
        }
    }
}
```

3. Fully group the following expression. Assuming `int i=10`, `boolean b = true`, and `double d = 10.0`, show all the steps for evaluating the following expression.

`i ++ * 2 <= d + i || 3 * -- i < 5 && d == 10 | b`

4. When compiling a program that declare `i` as a `int` type variable, the compiler generate the following error message. Explain.

```
Message.java:4: operator || cannot be applied to boolean,int
    if (i == 2 || 3)
               ^
1 error
```

5. Which one(s) of the following is/are single Java statement(s)? For those which are not, why?

- | | |
|-----|---|
| (a) | <code>int a = 0</code> |
| (b) | <code>a+5;</code> |
| (c) | <code>while (a == 0) {
 System.out.println("Hello, World!");
};</code> |

```
(d) if (a==0) {
    System.out.println("Hello, World!");
}
else {
    System.out.println("Hello!");
}
```

6. Write a switch statement equivalent to the following nested if statement. Assume *i* is of type int.

```
if (i == 1 || i ==2) {
    if (i==1)
        System.out.println("i is 1.");
    System.out.println("i is 1 or 2.");
} else if (i==3) {
    System.out.println("i is 3.");
} else {
    System.out.println("Something else.");
}
```

7. Why the following switch/case statement is invalid? State *all* reasons.

```
double d1 = in.readDouble(),
       d2 = in.readDouble();
switch (d1) {
case 2.0:
    System.out.println("Hello!");
    // Fall through
case d2:
    System.out.println("Hi!");
    break;
default:
    // Do nothing.
}
```

8. List all statements in the following part of program, including those statements that form parts of other statements.

```
public class SqrTable {
    public static void main(String[] args) {
        int i = 1, largest_num = 10;
        while (i <= largest_num) {
            System.out.println(i + " square is " + i * i);
            i += 1;
        }
    }
}
```

9. In the following program, for how many iterations the while loop (i.e. loop body) executes?

```
public class SqrTable {
    public static void main(String[] args) {
        int i = 1, largest_num = 10;
        while (i <= largest_num) {
            if (i % 2 == 0)
                ++i;
            else
                i *= 2;
        }
    }
}
```

10. What is the loop invariant of the program in question 8?

Section 2: Program Debugging

Fix all errors in the following program, without modifying the intuitive meaning, so that it can be executed and it makes sense:

```
/* Calculate the number of digits in a given number */
import chapman.io.*;
public class NumDigits {
    public static void main() {
        System.out.print("Enter a number: ");
        StdIn in = new StdIn();
        int i = in.readInt();
        if (i == 0) {
            System.out.println("0 has 1 digit.");
        };
        else {
            int i2 = i;
            if (i < 0)
                i = -i;
            int num_digits = 1;
            while (i != 0)
                ++num_digits;
            i /= 10;
            System.out.println(i2 + " has " + num_digits + " digits.");
        }
    }
}
```

After fixing the whole program, re-introduce each error into the program one-by-one, and compile the program each time an error is re-introduced. Write down the error message that the compiler outputs, and the intuitive meaning of the error message.

Section 3: Program Development

Write a program to print the calendar of any month of any year. You can assume that the year is always between 1700 and 5000, and month is always between 1 and 12. The calendar should contains 7 days in each line, from Sunday to Saturday.

```
Year: 2000
Month: 11
Calendar for 11/2000
      1  2  3  4
  5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30
```

Hints:

1. You may find the lecture notes useful when calculating the day of week of the first day of a month, and also when finding the number of days in a month.
2. To print a number num so that it occupies 2 columns, you can use `Fmt.printf("%2d", num);` instead of `System.out.print(num);`.

Think of one or more enhancement of the program. Is it possible with the knowledge you currently have? If so, add it into your program. Otherwise, explain what else you need in order to program it.