

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

Assignment 1

Assigned 2:00pm Sept 25, 2000; dead 2:00pm Oct 9, 2000.

Assignment box: R5

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 your tutor (gechen@csis.hku.hk) indicating that you have submitted an assignment.

Section 1: Short Questions

1. Choose all that applies. The Java byte-code compiled on the Pentium can be executed:
 - (a) directly on a Pentium.
 - (b) directly on a Mac.
 - (c) directly on a Java Virtual Machine.
 - (d) indirectly on Pentium using a Java bytecode interpreter.
 - (e) indirectly on Mac using a Java bytecode interpreter.
2. Which of the following statements are correct?
 - (a) Most programmers do not program in machine language.
 - (b) People do not want to program in machine language because it is too complicated.
 - (c) C++ provides more language features than Java.
 - (d) C++ provides more standard libraries than Java.
3. Which of the followings is/are valid identifiers in Java? Choose all that applies. For each of valid identifier, state whether you expect it to be a variable, constant, name of program or something else. For each invalid identifier, explain why they are invalid.

| | | | | | | |
|--------------------------|------------------------|----------------------------|--------------------|------------------------|------------------|-------------------------|
| <code>_BIRTH_RATE</code> | <code>done_flag</code> | <code>INTERNATIONAL</code> | <code>throw</code> | <code>2_of_best</code> | <code>Pi2</code> | <code>inThisTest</code> |
|--------------------------|------------------------|----------------------------|--------------------|------------------------|------------------|-------------------------|
4. Write down Java statements to declare a double variable **salary** with the initial value 17000.0, an boolean variable **bold** with no initial value, and an int constant **NUM_WHEELS** with the value 4.
5. Assume that a, b and c are variables of type `int`, `long` and `float`, with the value 27, 58L and -7.0E2 respectively. Fully group the following expressions, and find their values and types. Show all intermediate steps in the order in which the computer finds the value of the expressions.

$2.5 + a / 7 * c - b \% 8 * (c * -b + 9.0)$

$a += b - ((short)(c += -c * 5 + 8))$

6. Assuming that a, b and c are of type `int`, `short` and `double` respectively. Which of the following statements are invalid Java statements? Why?
 - (a) `c = a + (short) 2.0;`
 - (b) `a = b + 3;`
 - (c) `b = (short) 5 + b;`
 - (d) `(int) b = 3;`
7. Assume that a is a variable of type `int`. Give an expression that has type `int` when a contains 1, and type `double` if otherwise. Or argue that there is no such expressions.

8. Add statements to the following program to read temp_in_c from the keyboard using the chapman library.

```

/* Convert from Celcius to Fahrenheit */
public class CToF {
    public static void main(String[] args) {
        double temp_in_c = 25.0;
        double temp_in_f = temp_in_c * 9 / 5 + 32;
        System.out.println(temp_in_c + " degrees in Celcius is "
            + temp_in_f + " degrees in Fahrenheit.");
    }
}

```

9. The following is part of a Java program. List out all the identifiers of the program. Do the same for reserved words, constants, operators and also comments. Also list out all non-space characters of the program that are not one of the above.

```

StdIn in = new StdIn();
double a = in.readDouble();
a += in.readDouble();
int for_all = (int) a; // Truncate, not round.
for_all = for_all + 2;
System.out.println("Test of " + for_all + ".");

```

10. Choose all that applies. The following program:

```

public class T {
    public static void main
        (String[] args) {
        double a = 10.0;
        a += 50.0;
        double b = 10.0;
        system.out.println(a+" "+b);
    }
}

```

(a) Prints a line containing "70.0".
(b) Prints a line containing "60.010.0".
(c) Is invalid because the second variable declaration statement is after an assignment statement.
(d) Is invalid because "system" is undefined.

Section 2: Program Debugging

Fix all errors in the following program, without modifying the intuitive meaning:

```

public Class TestProg {
    public static void main(String args) {
        Stdin keyboard = new Stdin();
        String s = "Hello"
        System.out.println("What is your name?");
        String name = keyboard.readDouble();
        System.out.println(s, name);
    }
}

```

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

The body mass index (BMI) of a person is defined as the ratio of body mass in kilograms to the square of body height in meter. For example, a person of 1.8m tall with weight 55kg has $BMI = 55 / (1.8)^2 = 16.975308641975307$. A person with BMI between 20 and 25 is considered to have a healthy amount of body fat. A person with BMI of less than 20 is regarded as underweight, and one with a BMI of more than 25 is regarded as overweight.

Write a program to calculate the body mass index (BMI) of the user. Ask the user for their height and their mass. Allow the user to enter both in inches and meters, and both in pounds and kilograms. Also output the meaning of the BMI.

Note that $1\text{kg} = 2.2\text{lb}$, and $1\text{in} = 0.0254\text{m}$.

Example **input/output**:

```
What is your weight? 55
In lb or kg? (1=lb, 2=kg) 2
What is your height? 1.8
In in or m? (1=in, 2=m) 2
Your BMI is 16.975308641975307.
You are underweight.
```

(Hint: your program may consider any number other than "1" to mean "kg" and "m" in the second and fourth lines respectively.)

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.