

Due: Wed 23:50

Name: _____ Student ID: _____ Class: _____

Professor: Jong-Kyou Kim, PhD _____

1. The following program prints `Hello, world!` using Java. Fill in the blanks to complete the program.

```
_____ _____ Test01 {  
    _____ _____ main(_____ [] args) {  
        _____.___.println("Hello, world!");  
    }  
}
```

2. The following programs print the value for Fibonacci number 10 using different types of Java methods. Fill in the blanks to complete the program.

(a)

```
_____ _____ Test02 {  
    _____ int fib(int n) {  
        if (n <= 2)  
            return 1;  
        else  
            return fib(n-1) + fib(n-2);  
    }  
    _____ _____ main(_____ [] args) {  
        _____.___.println(fib(10));  
    }  
}
```

(b)

```
_____ Test03 {  
    int fib(int n) {  
        if (n <= 2)  
            return 1;  
        else  
            return fib(n-1) + fib(n-2);  
    }  
    public static void main(String [] args) {  
        _____ obj = ____ _____();  
        System.out.println(obj.fib(10));  
    }  
}
```

3. The following programs may or may not be successfully compiled and executed. If successfully compiled, show the output of the program. If not, explain the cause of error.

(a)

```
public class Test04 {  
    public static void main(String [] args) {  
        int _ = 3;  
        System.out.println("Value of _ is" + _);  
    }  
}
```

(b)

```
public class Test04 {  
    public static void main(String [] args) {  
        int if = 3;  
    }  
}
```

4. Explain the data type of the following operations

```
boolean b = true;
```

```
int i = 3, j = 4;  
double d = 3, e = 4;  
String s = "hello";
```

(a) i/j

(b) i/b

(c) d/e

(d) d/j

(e) $s+d$

(f) $s-e$

(g) $i+b$

5. What is the output of the following code?

```
int i = 1, j = 2, k = 3;  
if (i > j)  
    if (j > k)  
        System.out.println("A");  
else  
    System.out.println("B");
```

6. The following program gets an integer from the keyboard and print the incremented value of it to the terminal. Fill in the blanks to complete the program.

```

_____ _____._____.Scanner;
public class Test08 {
    public static void main(String [] args) {
        _____ input = new _____(_____.in);
        int i = input.nextInt();
        _____.___.println(i + 1);
    }
}

```

7. The following program shows the cancellation error. Write the following program and observe the output.

```

double x = 1000000000.0 + 0.0000000001;
if (x == 1000000000.0) {
    System.out.println("true");
}
else {
    System.out.println("false");
}

```

8. (*Demonstrate cancellation errors*) A cancellation error occurs when you are manipulating a very large number with a very small number. The large number may cancel out the smaller number. For example, the result of $1000000000.0 + 0.0000000001$ is equal to 1000000000.0 . To avoid cancellation errors and obtain more accurate results, carefully select the order of computation. For example, in computing the following series, you will obtain more accurate results by computing from right to left rather than from left to right:

$$1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$$

Write a program that compares the results of the summation of the preceding series, computing from left to right and from right to left with $n = 50000$.

9. You can approximate e using the following series:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \cdots + \frac{1}{n!}$$

[*Hint:*]

$$\frac{1}{i!} = \frac{1}{(i-1)!} \frac{1}{i}$$

- (a) Show approximations for $n=200$ and $n=100000$.
- (b) What is the difference between the two values?