Due: Tue 23:50

Name: _____ Student ID: _____ Class: _____

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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 succesfully 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 Test05 {
    public static void main(String [] args) {
        int if = 3;
    }
}
```

4. Explain the data type of the follwing 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 `100000000.0 + 0.000000001` is equal to `100000000.0`. 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?