

CUHK(SZ)-CSC1003 Midterm Exam

Oct. 30, 2022

Name:

Student ID:

Note:

- a. This is a closed exam. No notes, calculators, or dictionaries are allowed.
- b. This exam paper has five pages, in single-sided printing.
- c. Answer all questions within 100 minutes.

Example Question:

Read the following java program, and write down your answer(s).

```
public class HelloWorld {  
    public static void main(String[] args) {  
        System.out.println("Hello World!");  
    }  
}
```

What is the output of the program when running “java HelloWorld”?

Hello World!

1. (10 points) Read the following java program, and write down your answer(s).

```
public class TestNumber1 {
    public static void main(String[] args) {
        int a0 = 0;
        int a1 = 1;
        int a2 = a0 + a1; = 1
        int a3 = a1 + a2; = 2
        int a4 = a2 + a3; = 3
        System.out.println(a0);
        System.out.println(a1);
        System.out.println(a2);
        System.out.println(a3);
        System.out.println(a4);
    }
}
```

What is the command to compile the program?

5' javac TestNumber1.java

What is the output of the program when running "java TestNumber1"?

0
1
1
2
3

2. (10 points) Read the following java program, and write down your answer(s).

```
public class TestNumber2 {
    public static void main(String[] args) {
        int a = 3;
        int b = 4;
        a = a + b;
        b = a - b;
        a = a - b;
        System.out.println("a = " + a);
        System.out.println("b = " + b);
    }
}
```

What is the output of the program when running "java TestNumber2"?

a=4
b=3 — 5'

3. (15 points) Read the following java program, and write down your answer(s).

```

public class TestNumber3 {
    public static void main(String[] args) {
        int num1 = Integer.parseInt(args[0]);
        int num2 = Integer.parseInt(args[1]);
        for (int i = num1; i <= num2; i++) {
            int count = 0;
            for (int j = 2; j <= i/2; j++)
                if (i % j == 0) count++;
            if (count == 0) System.out.print(i + " ");
        }
    }
}

```

Handwritten notes and diagrams:

- A diagram of a 4x4 grid with arrows pointing to the first and second columns.
- $i = 9$
- $2 \quad 9 \% 2 \neq 0$
- $3 \quad 9 \% 3 = 0 \quad \text{count} = 1$
- $i \sim [3, 20]$
- prime $\&$ $i = 3$
- $j = 2$
- $i = 4$
- $3 \% 2$
- $9 \quad 2, 3, 4$

What is the output of the program when running “java TestNumber3 3 20”?
 (Hint: in java, “%” calculates the remainder of integer divisions, i.e., $9 \% 3$ is 0, $8 \% 3$ is 2, $7 \% 3$ is 1, ...)

3 5 7 11 13 17 19

4. (15 points) Read the following java program, and write down your answer(s).

```

public class TestString {
    public static void main(String[] args) {
        int N = Integer.parseInt(args[0]);
        String ruler = " ";
        for (int i = 1; i <= N; i++) ruler = ruler + i + ruler;
        System.out.println(ruler);
    }
}

```

What is the output of the program when running “java TestString 4”?

1 2 1 3 1 2 1 4 1 2 1 3 1 2 1

5. (15 points) Read the following java program, and write down your answer(s).

```
public class TestArray1 {
    public static void main(String[] args) {
        int[] a = {1, 2, 3, 4, 5};
        int[] b = {4, 3, 2, 1};
        System.out.println("a.length = " + a.length);
        System.out.println("b.length = " + b.length);
        b = a; ← After this, b and a refer to the same array
        for (int i = 0; i < b.length; i++) b[i]++;
        System.out.print("Array a:");
        for (int i = 0; i < a.length; i++) System.out.print(" " + a[i]);
        System.out.println();
        System.out.print("Array b:");
        for (int i = 0; i < b.length; i++) System.out.print(" " + b[i]);
    }
}
```

What is the output of the program when running "java TestArray1"?

```
a.length = 5
b.length = 4
Array a: 2 3 4 5 6 5'
Array b: 2 3 4 5 6 5'
```

6. (15 points) Read the following java program, and write down your answer(s).

```
public class TestArray2 {
    public static void main(String[] args) {
        int[] a = new int[args.length];
        for (int i = 0; i < args.length; i++)
            a[i] = Integer.parseInt(args[i]);
        for (int i = 0; i < a.length; i++)
            for (int j = i+1; j < a.length; j++)
                if (a[i] > a[j]) {
                    int temp = a[i];
                    a[i] = a[j];
                    a[j] = temp;
                }
        for (int i = 0; i < a.length; i++) System.out.print(a[i] + " ");
    }
}
```

What is the output of the program when running "java TestArray2 9 8 7 6 5 4 3 2 1"?

```
1 2 3 4 5 6 7 8 9
```

7. (5 points) List five or more primitive data types in java language.

int . double . float . char . byte . boolean . long . short

X Integer

String X → class

8. (5 points) List two or more types of loops in java language, each with example code.

{ for (int i=0; i<n; i++) a[i]++;
while (i<n) i++;
do { i++; } while (i<n)

string str1 = "HelloWorld!"
 0 1 2 3 4 5
char ch1 = str1.charAt(5);

9. (5 points) For a two dimensional java array created by "int[][] a = new int[10][5]", what are the values of a.length and "a[0].length" respectively?

a.length = 10 ← 50 X a. 10 elements

a[0].length = 5

a = { a[0], a[1], ... a[9] } 10

a[0] = { a[0][0], ... a[0][4] } 5

10. (5 points) What is the usage of "piping" of input/output when running programs?

→ The output of one program is used as the input of the other program

X threads