香 港 中 文 大 學
The Chinese University of Hong Kong

Midterm Examination 2018-19 (Spring) 2nd term

Course Code & Title : CSCI1530 Computer Principles and Java Programming

Time allowed : 1 hour 30 min Room : ERB 404

Student I.D. No. : 1155119394 Class : CSCI 1530

Answer **ALL** Questions. Full Score is 100%. Write your student I.D. clearly on each page.
Please mark all your answer on the space provided in this question-answer book.
Use the symbol ␣ to denote space in your answer where needed.

Question 1 (20%): Show the output produced by each segment of code below:

(a)

```
System.out.println("pi="+2+1.14);
System.out.print(1/2 * 9);
```

pi=21.14
0

(b)

```
System.out.print(true);
System.out.println(1 != 2);
```

true true

(c)

```
int x = -5, y = 4;
if (x * x < y * y)
    System.out.print("A");
    if (y % 2 != 1)
        System.out.print("B");
else
    System.out.print("C");
```

B

(d)

```
int a = 3, i, j = 9;
for (i = 4; i >= -2; i -= 2)
    for (j = 0; j <= 7; j += 3)
        a++;
System.out.println(a);
System.out.println(j);
```

15
9

(e)

```
int x = 6;
System.out.println((x = 2) + 2);
System.out.println(x == 6);
```

4
false

Marker's Use Only

Question	1	2	3	4	5	Total
Score	17	30	16	6	20	89
Full	20	30	20	10	20	100

Question 1 con'd...

(f)

```
boolean b;
if (b = Math.PI >= Math.sqrt(9)))
    System.out.println(b);
```

true

(g)

```
do
    while (true) {
        System.out.println(1);
        break;
    }
while (false);
```

1

(h)

```
int k = -5;
System.out.println(k *= 1 - 6);
```

25

(i)

```
short a = 137, b = 189, c = 0, d = 254;
if (a == 137 && b == 189)
    System.out.println("CUHK");

System.out.println(a+"."+b+"."+c+"."+d);
```

-110. -66. 0. -1

-2

(j)

```
int sid = 1177654321;
System.out.println(sid / 1000000 % 100);
System.out.println(sid % 1000000 / 1000);
```

77

4

-1

Question 2 (30%): Write a **FULL** Java class **`Power`** COMPLETE with import statement and with a **`main()`** method for finding power dissipation of a DC circuit for a user through console input/output. The program **asks for two numbers** from the user, namely, **current I (in ampere) and resistance R (in ohm)**. No input validation and no exception handling is required. The program **prints power P (in watt), with 2 decimal places, calculated as current² x resistance ($P = I^2R$)**. Sample run with *italic user inputs*:

```
Current (amp): 3.5
Resistance (ohm): 47
Power = 575.75W
```

Keywords: **`System.out, System.in, java.util.Scanner, nextDouble()`**

```
import java.util.*;
class Power{
  public static void main(String[] args){

    Scanner scanner = new Scanner(System.in);

    System.out.print("Current (amp): ");

    double current = scanner.nextDouble();
    System.out.print("Resistance (ohm): ");

    double resistance= scanner.nextDouble();

    System.out.printf("Power = %.2fW", current*current*resistance);

  }
}
```

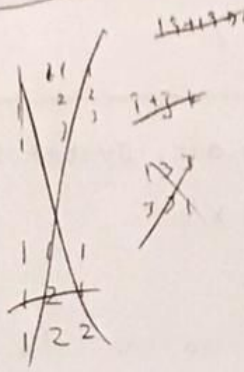
Question 3 (20%): Write a Java code fragment (just lines of declarations and statements) to generate and print all possible triangles with integral side-lengths within 20. It also outputs count.

For example, sides 3, 4, 5 can form a triangle because | 3 + 4 > 5 and 4 + 5 > 3 and 5 + 3 > 4 |

I.e., sum of length of any two sides should be greater than length of the remaining side.
Output order of the triangles does not matter BUT no repeated triangles shall be printed.

Answer:

```
int count = 0;
for(int i = 1; i <= 20; i++)
    for (int j = 1; j <= 20; j++)
        for (int k = 1; k <= 20; k++)
            if ( i + j > k && i + k > j && j + k > i) {
                System.out.println( i + ", " + j + ", " + k);
                count ++;
                break;
            }
System.out.print ("Count = " + count);
```



Sample Output:

```
1, 1, 1
1, 2, 2
1, 3, 3
...
19, 19, 20
19, 20, 20
20, 20, 20
Count = 1540
```

Question 4 (10%): Answer the following questions about *computer principles and concepts*.

a) Name the two properties in an object that can store data and perform action respectively. (2%)

① instance
② performance

b) Both **`int`** and **`float`** types are of 32 bits. What are their differences? (4%)

"int" is integer represented by binary in computer.
"float" is float-point number represented by mantissa and exponent in computer

c) Explain the effect of the following statement: (4%)

```
i = (int) (x + 0.5);  // where i is an int, x is a float
```

First, x + 0.5 results in "double" value,
Next, with the use of (int), change the data type of (x+0.5) into "int"
Then "i" stores (x + 0.5) in "int" type
However (x+0.5) only round down to integer.

Question 5 (20%): Answer the following question about *looping and pattern printing*…

Write some Java code to print an X pattern and to show its dimensions. (20%)

No input validation is needed. Assume side is *at least* 3.

`DON'T hard-code the side, say, 3, which is just an example.`

```
\   /
 \ /
  X
 / \
/   \
Side is 3
Size is 5x5
```

```
int side = Integer.parseInt(JOptionPane.showInputDialog("Side?"));

for(int i = 1 ; i <= side * 2 -1 ; i++) {
  for( int j=1 ; j<= side*2-1 ; j++)
  if( i == side && j== side)
     System.out.print("X");
  else if( i == j)
     System.out.print("\\");
  else if( i+j == side * 2)
     System.out.print("/");
  else
     System.out.print("␣");
System.out.println();
}
System.out.println("Side␣is␣" + side);
System.out.print("Size␣is␣"+(side*2-1)+"x"+(side*2-1));
```

well done !