

香港中文大學  
The Chinese University of Hong Kong

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Midterm Examination 2018-19 (Spring) 2<sup>nd</sup> term

Course Code & Title : CSCI1530 Computer Principles and Java Programming

Time allowed : 1 hour 30 min Room : ERB 404

Student I.D. No. : 1155118394 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)	<pre>System.out.println("pi="+2+1.14); System.out.print(1/2 * 9);</pre>	$\pi = 21.14$ <u>a</u>
(b)	<pre>System.out.print(true); System.out.println(1 != 2);</pre>	true true <u>  </u>
(c)	<pre>int x = -5, y = 4; if (x * x &lt; y * y)     System.out.print("A"); if (y % 2 != 1)     System.out.print("B"); else     System.out.print("C");</pre>	<u>B</u>
(d)	<pre>int a = 3, i, j = 9; for (i = 4; i &gt;= -2; i -= 2)     for (j = 0; j &lt;= 7; j += 3)         a++; System.out.println(a); System.out.println(j);</pre>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">             ① ③              4 0              2 3              0 6              -2 9              -4         </div> <div>             +)              4              12              3         </div> </div> <u>15</u> <u>9</u>
(e)	<pre>int x = 6; System.out.println((x = 2) + 2); System.out.println(x == 6);</pre>	4 <u>false</u>

Marker's Use Only

Question	1	2	3	4	5	Total
Score	<u>17</u>	<u>30</u>	<u>16</u>	<u>6</u>	<u>20</u>	<u>89</u>
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);
```

$$k = k * (1 - 6)$$

$$-5 \quad -5$$

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

1 2  
2 4  
3 8  
4 16  
5 32  
6 64  
7 128  
8 256  
9 512  
10 1024  
11 2048  
12 4096  
13 8192  
14 16384  
15 32768  
16 65536  
17 131072  
18 262144  
19 524288  
20 1048576  
21 2097152  
22 4194304  
23 8388608  
24 16777216  
25 33554432  
26 67108864  
27 134217728  
28 268435456  
29 536870912  
30 1073741824  
31 2147483648  
32 4294967296  
33 8589934592  
34 17179869184  
35 34359738368  
36 68719476736  
37 137438953472  
38 274877906944  
39 549755813888  
40 1099511627776  
41 2199023255552  
42 4398046511104  
43 8796093022208  
44 17592186044416  
45 35184372088832  
46 70368744177664  
47 140737488355328  
48 281474976710656  
49 562949953421312  
50 1125899906842624  
51 2251799813685248  
52 4503599627370496  
53 9007199254740992  
54 18014398509481984  
55 36028797018963968  
56 72057594037927936  
57 144115188075855872  
58 288230376151711744  
59 576460752303423488  
60 1152921504606846976  
61 2305843009213693952  
62 4611686018427387904  
63 9223372036854775808  
64 18446744073709551616  
65 36893488147419103232  
66 73786976294838206464  
67 147573952589676412928  
68 295147905179352825856  
69 590295810358705651712  
70 1180591620717411303424  
71 2361183241434822606848  
72 4722366482869645213696  
73 9444732965739290427392  
74 18889465931478580854784  
75 37778931862957161709568  
76 75557863725914323419136  
77 151115727451828646838272  
78 302231454903657293676544  
79 604462909807314587353088  
80 1208925819614629174706176  
81 2417851639229258349412352  
82 4835703278458516698824704  
83 9671406556917033397649408  
84 19342813113834066795298816  
85 38685626227668133590597632  
86 77371252455336267181195264  
87 154742504910672534362390528  
88 309485009821345068724781056  
89 618970019642690137449562112  
90 1237940039285380274899124224  
91 2475880078570760549798248448  
92 4951760157141521099596496896  
93 9903520314283042199192993792  
94 19807040628566084398385987584  
95 39614081257132168796771975168  
96 79228162514264337593543950336  
97 158456325028528675187087900672  
98 316912650057057350374175801344  
99 633825300114114700748351602688  
100 1267650600228229401496703205376



**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  $\text{current}^2 \times \text{resistance}$  ( $P = I^2 R$ )**. 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 = %.2f W", 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

$$3 + 4 > 5 \text{ and } 4 + 5 > 3 \text{ and } 5 + 3 > 4$$

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 = i; j <= 20; j++)
        for (int k = j; 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.

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

(20%)

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

1 2 3 4 5  
 1 \ / 6 4 7 3 5 2x n-1  
 2 \ / 6 4 7  
 3 X 6 4 7  
 4 / \ 6 4 7  
 5 / \ 6 4 7  
 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 + "x" + (side * 2 - 1));
```

Well done !