Basis of Computer Programming (java A)
Tutorial 2

[Experimental Objective]

1. Learn how to input and output by command-line.
2. Learn some important features of Java, including
   - Displaying data on the screen in a Command Prompt;
   - Performing calculations.
3. Learn how to generate some random numbers by using Math.random().

[Exercises]

1. According to the following statement, please modify them to display your name?

Statement

```
System.out.println("ZZZZZ Y   Y\n"
                 + "    Z  Y Y \n"
                 + "   Z    Y  \n"
                 + "  Z     Y  \n"
                 + " Z      Y  \n"
                 + "Z       Y  \n"
                 + "ZZZZZ   Y  \n"

);
```

Sample output

```
zhaoyao:src zhaoyao$ java ShowYourName
My initials:
ZZZZZ Y   Y
    Z  Y Y
   Z    Y
  Z     Y
 Z      Y
Z       Y
ZZZZZ   Y
```

2. Please design your program to show your personal information as following:

```
zhaoyao:src zhaoyao$ java PersonalProfile
Name:Leo
Age:18
Zodiac:Leo
Tall:177
Weight:57.3
Hobby:dancing
Favorite color(s):red, yellow, blue
```

Please choose reasonable built-in types to present above information.

3. What is the output of following code? Please modify the code to make the result right.

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```
int int_max = Integer.MAX_VALUE;
int int_max_plus1 = int_max + 1;
int int_max_plus2 = int_max + 2;
int int_min = Integer.MIN_VALUE;
int int_min_minus1 = int_min - 1;
int int_min_minus2 = int_min - 2;


System.out.println("Integer MAX_VALUE:" + int_max);
System.out.println("Integer MAX_VALUE + 1:" + int_max_plus1);
System.out.println("Integer MAX_VALUE + 2:" + int_max_plus2);
System.out.println("Integer MIN_VALUE:" + int_min);
System.out.println("Integer MIN_VALUE - 1:" + int_min_minus1);
System.out.println("Integer MIN_VALUE - 2:" + int_min_minus2);
```

4. Write a program that reads in three string arguments (x, y and z) by command line. Declaring a boolean variable named b, and it is true if the initial value of these three strings are either in ascending or in descending alphabet order, otherwise it is false. Print the variable b.

   Tips: if str is a String type variable, we can use str.charAt(0) to get its initial. we can use Character.toUpperCase('a') to convert the character argument to uppercase or use Character.toLowerCase('A') to convert the character argument to lowercase.

   Here are some sample runs :

```
zhaoyao:src zhaoyao$ java Order Alice bob Cuby
Are the three arguments in ascending or in descending alphabet order?true
zhaoyao:src zhaoyao$ java Order cuby bob Alice
Are the three arguments in ascending or in descending alphabet order?true
zhaoyao:src zhaoyao$ java Order cuby alice Bob
Are the three arguments in ascending or in descending alphabet order?false
zhaoyao:src zhaoyao$ java Order Bob cuby alice
Are the three arguments in ascending or in descending alphabet order?false
```

5. Your teacher asks you to calculate the weight of a ball. The radius of balls can usually present as an integer, and density can usually present as a double. Both arguments can pass to program by command line. Then you can calculate the weight of ball using this formula: density*(4/3)*πr^3, and convert the result to integer by two methods (rounding-off and truncation).
   Note that you can use the Math.PI present π, and you can use the Math.pow(a, 3) to computer a^3.

   Here is a sample run :

```
zhaoyao:src zhaoyao$ java BallWeight Zhao 6 1.01
I am learning Java programming.
My teacher Zhao asks me to calculate the weight of a ball.
Its radius is:6
Its density is:1.01
So its weight is:913.826471076199
Convert the weight to an integer by rounding-off method:914
Convert the weight to an integer by truncation method:913
```

6. Please write a program to help a primary school mathematics teacher to automate generate mental arithmetic questions. The program reads one command-line argument N, generate two pseudo-random integers between 0 and N-1, then print the sum, product, difference, quotient (division) and mod of the two integers.

Tips: we can use "try catch" block to deal with division by 0. Here is the sample code:

```
try {
    System.out.println((16 / 0));
} catch (ArithmeticException e) {
    System.out.println(e.getMessage());
}
```

Here are sample runs about this problem:

```
zhaoyao:src zhaoyao$ java MentalArithmeticAbilityTest 10
7 + 7 = ?
Answer:14
7 - 7 = ?
Answer:0
7 * 7 = ?
Answer:49
7 / 7 = ?
Answer:1
7 % 7 = ?
Answer:0
```

```
zhaoyao:src zhaoyao$ java MentalArithmeticAbilityTest 20
16 + 0 = ?
Answer:16
16 - 0 = ?
Answer:16
16 * 0 = ?
Answer:0
16 / 0 = ?
/ by zero
16 % 0 = ?
/ by zero
```