Introduction to Computer Science: Practice 3

[Basic Training]

1. Please remove the **break** statement in the program `SwitchExample01` and evaluate the execution result. Explain the result.

2. Please write a program using **switch** statement:
   
   Let user input a character (but be A, a, B, b, C, c, D, or d)
   If user input A or a, then print “Your grade is >= 80”
   If user input B or b, then print “Your grade is between 70 and 80”
   If user input C or c, then print “Your grade is between 60 and 70”
   If user input D or d, then print “Your grade is below 60”
   If other character is inputted, then print “Invalid character”

3. [Lazy Evaluation] Please evaluate the following code and explain the result.

```java
int i = 0, j = 0;
if (j != 0 && i++ == j){
    System.out.println("never in branch");
}
System.out.println(i + " " + j);
```

4. Please write a java program that use do-while loop to display 5 lines of “Hello world!!” string.

5. Please write a java program that keep asking the user to enter two number a and b until a+b is even.
   (Hint: You may need to use `ConsoleIn` for input)

6. Please write a java program that use for loop to display the number from 1993 to 2011 on separate lines.
7. Please check the result of the following codes and explain it.

```java
for(int x=0;x<2;x++)
{
    for(int y=0;y<3;y++)
    {
        System.out.println("x = ", x, ", y = "+ y);
    }
}
```

8. Please modify the codes of the previous problem to show a multiplication table.
The result contains all the results of a*b where a and b are integers such that 1 <= a, b <= 9
Output (partial):

```
1 * 1 = 1
1 * 2 = 2
...```

[Advanced Training]

1. Please write a program that
   I. accepts an additive expression from user
   II. prints the evaluation result of the given expression on console

   ```
   Please input an additive expression: 21+22
   43

   Please input an additive expression: 100+5
   105
   ```
   (hint: use indexOf(), substring(), length() and Integer.parseInt())

2. Please write a java program to evaluate whether the inputted string is the valid NCKU course number (課程代碼).
The program would
1. Ask user to input a course number string
2. Trim the string (hint: use trim() method of String)
3. Evaluate the inputted string. If the string is valid course number, the program would output “correct format”, otherwise the program would output “wrong format”

The evaluation rules are listed as follows:
I. The course number is consisted of 5 characters.
II. The first character of the course number must be upper case alphabet.
III. The last four characters of the course numbers must be numbers(0~9)

### Example

<table>
<thead>
<tr>
<th>Please input a NCKU course number:</th>
<th>E2101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct format</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Please input a NCKU course number:</th>
<th>Q3410</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct format</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Please input a NCKU course number:</th>
<th>1A341</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong format</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Please input a NCKU course number:</th>
<th>A312341</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong format</td>
<td></td>
</tr>
</tbody>
</table>

3. Enhance the program of “Practice 3 Advanced Training 1” to fulfill the following requirements:
   A. Ability to print out the equation correctly when a1, b1, c1, a2, b2, c2 are negative numbers
   B. Ability to handle the many solutions (無限多組解) condition (Δ = Δx = Δy = 0)
   C. Ability to handle the no solution (無解) condition (Δ = 0, Δx or Δy ≠ 0)

### Example

<table>
<thead>
<tr>
<th>Please input a1:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please input b1:</td>
<td>-1</td>
</tr>
<tr>
<td>Please input c1:</td>
<td>2</td>
</tr>
<tr>
<td>Please input a2:</td>
<td>-3</td>
</tr>
<tr>
<td>Please input b2:</td>
<td>3</td>
</tr>
<tr>
<td>Please input c2:</td>
<td>5</td>
</tr>
<tr>
<td>1st equation:</td>
<td>1.0 x - 1.0 y = 2</td>
</tr>
<tr>
<td>2nd equation:</td>
<td>-3.0 x + 3.0 y = 5</td>
</tr>
<tr>
<td>No solution!!</td>
<td></td>
</tr>
</tbody>
</table>

4. Fibonacci sequence are defined as follows:

\[ F_1 = 0, F_2 = 1 \]
\[ F_n = F_{n-1} + F_{n-2} \text{ for integer } n>2 \]
Please write a java program that can display the n-th element of Fibonacci sequence with given input n by using loop.
Input: positive integer n such that 1 <= n <= 40
Output: the n-th element of Fibonacci sequence

Example

```
Please input n: 10
The n-th element of Fibonacci sequence is: 34
```

5. Please write a java program for a number guessing game.
The game has an integer answer such that 0 < answer < 100
Each time the user guesses a number and the game tells if the answer is correct
If the user’s guess is wrong, the game indicate the comparison between the user’s guess and the answer (larger/smaller)
The game finishes when the user makes a correct guess.
Check the following example for more information.

In the following example, the input and output use different colors.

```
Guessing a number in (0,100)
Guessing a number: 60
No, it’s too large!
Guessing a number: 50
No, it’s too small!
Guessing a number: 66
Oh! You got it! The answer is correct.
```