A Final Lab Assessment

Note: The name of your program should follow the format: Lab_*SectionName_ID_First name* (example Lab_5A_1234567_Yousuf.java)

Write a program in Java that displays this Menu :

1) **Play game**
2) **Print the Sequence**
3) **Exit**

The **program should repeat** until the user chooses option 3.

1. If the user chooses option 1, **playGame( )** method is to be called. This method should generate a random number from 100 to 999 (both included). Then it should prompt the user to guess one digit at a time as shown in the sample run. When the user makes a correct guess, the digit is to be displayed along with its position in the 3-digit number. When all three digits are guessed correctly the method should display the (randomly generated) number and the number of misses. See sample output for more details.

2. Consider the following sequence of 6 terms:

$$\frac{4}{2!}-\frac{6}{3!}+\frac{10}{5!}-\frac{16}{8!}+\frac{26}{13!}-\frac{42}{21!}$$

For the numerator, the series 4, 6, 10, 16, 26, 42, is obtained as follows - Given the first two terms as 4 and 6, the 3rd term is obtained by adding the two terms before it. Similarly, the fourth term is obtained by adding the two terms before it and so on. The terms in the denominator are obtained similarly with the first two numbers as 2 and 3.

If the user chooses option 2, the method **void printSequence(Scanner in)** is to be called. A Scanner object is to be passed to this method as parameter. Then, inside the method the user is prompted to enter an integer number (from 1 to 6) which represents the number of terms in the Sequence. If the user enters a number that is out of range, the method should ask the user to enter the number again. If the user enters a valid number, then that many terms of the sequence are printed along with the calculated value as shown in the sample output.

You will need to create another method **long factNumber(int num)** which calculates the factorial of a number. This method is to be used by the **printSequence()** method to calculate the factorial.

Note : The factorial of a number N is given by

$$N! = 1 \times 2 \times 3 \times 4 \cdots \times N$$

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SAMPLE OUTPUT

```
1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 67
Wrong choice! Please enter your choice again

1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 1
Enter the guess number : 3
3 is wrong!...try again
Enter the guess number : 0
 - - 0
Enter the guess number : 2
2 is wrong!...try again
Enter the guess number : 4
4 - -
Enter the guess number : 6
6 is wrong!...try again
Enter the guess number : 4
4 is wrong!...try again
Enter the guess number : 9
- 9 -

*** GREAT !!! YOU GUESSED THE NUMBER CORRECTLY.
THE NUMBER WAS 490
YOU MISSED 4 TIMES

1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 2
Enter a number between 1 and 7 : 54
THE NUMBER YOU ENTERED NOT IN RANGE FROM 1 TO 7
Enter the number between 1 and 7 : 2
4/2! -6/3!  = 1.000
```

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```
1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 2
Enter a number between 1 and 7 : 6
4/2! -6/3! + 10/5! -16/8! + 26/13! -42/21!  = 1.083

1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 2
Enter a number between 1 and 7 : 1
4/2!  = 2.000

1) Play game
2) Print the Sequence
3) Exit

Enter your choice : 3

*****  BYE BYE CS202  *****
<<< STAY AT HOME PLEASE >>>
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