

Exercise 1: SquareBoard

Exercise SquareBoard (nested-loop): Write a program called **SquareBoard** that displays the following $n \times n$ (n is user defined) pattern using two nested for-loops.

```
# # # # #
# # # # #
# # # # #
# # # # #
# # # # #
```

Your program should use only two output statements, one EACH of the followings:

```
System.out.print("# "); // print # and a space, without newline
System.out.println(); // print a newline
```

Hints:

```
public class SquareBoard {
    public static void main (String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.println("Please enter a number:");
        int size = s.nextInt();
        for (int row = 1; .....; ..... ) {
            for (int col = 1; .....; ..... ) {
                .....
            }
            .....
        }
    }
}
```

Exercise 2: Population Growth

Assume that the population of Mexico is 129 million and that it increases 1.24 percent annually. Assume that the population of the United States is 325 million and that the population increases 0.73 percent annually. Write an application that displays the populations of the two countries every year until the population of Mexico exceeds that of the United States. How many years will that take?

You can use a while loop, for example:

```
while (mexicoPopulation < usPopulation) {  
    System.out.println (...);  
    ...  
}
```

Homework exercise: Loan Payment Calculator

The following formula is used to calculate the fixed monthly payment, P , required to fully amortize a loan of L dollars over a term of n months at a monthly interest rate of c . (If the annual rate is 6%, for example, $c = 0.06 / 12 = 0.005$)

$$P = L \cdot \frac{c(1+c)^n}{(1+c)^n - 1}$$

Write an class named `MonthlyPaymentCalculator` whose main method calculates such a monthly payment, after prompting the user to enter the loan amount, the annual interest rate, and the term of the loan (in years).

Sample run:

```
This program calculates the fixed monthly payment to fully amortize a loan
-----
Enter the loan amount in dollars: 185000
Enter the annual interest rate (e.g., for 6%, enter 0.06): 0.035
Enter the term of the loan in years: 30
The fixed monthly payment for this loan will be $830.73.
The amount spent to pay off this loan over its entire term is $299063.76.
```

Helpful utilities: `java.util.Scanner`, `Math.pow()`, `DecimalFormat`