



Lab07: Loops

Objectives

Designing and implementing Java programs that deal with:

1. **while** loop statement.
2. **do-while** loop statement.
3. **for** loop statement.
4. Issues related to loops:
 - a. sentinel value ... end marker
 - b. nested loops
 - c. **break** statement
 - d. **continue** statement
 - e. common kinds of loop errors:
 - infinite loops
 - off-by-one-error ... repeat the loop body one too many times or one too few times

Syntax Reference

The following are syntaxes for the three types of loops of Java along with some examples.

do-while Loop Statement Syntax

```
do
{
    Statement_Block
} while (Boolean_Expression);
```

```
int start = 0;

do
{
    System.out.println(start);
    start++;
} while (start <= 3);
```

while Loop Statement Syntax

```
while (Boolean_Expression)
{
    Statement_Block
}
```

```
int start = 0;

while (start <= 3)
{
    System.out.println(start);
    start++;
}
```

for Loop Statement Syntax

```
for(initializing; Boolean_Expression; Update)
{
    Statement_Block
}
```

```
for(int start = 0; start <= 3; start++)
{
    System.out.println(start);
}
```



```
0
1
2
3
```

Exercises

Exercise #01:

(KFUPM.java)

Design and implement a program that will print

(A) **KFUPM IS THE BEST** 10 times

(B) **DHAHRAN** 5 times

NOTE 01: Use only 1 loop.

NOTE 02: Your output may be in any order but it is preferable to do as:

```
KFUPM IS THE BEST
KFUPM IS THE BEST
DHAHRAN
KFUPM IS THE BEST
KFUPM IS THE BEST
DHAHRAN
KFUPM IS THE BEST
KFUPM IS THE BEST
DHAHRAN
...
...
```

Exercise #02:

(Series.java)

Design and implement a program that will find the result of the following:

$$\sum_{i=53}^{i=15674} (2i + 5)$$

Exercise #03:

(Dividors.java)

Design and implement a program that will prompt the user to enter a number. The program shall give all numbers that divide that number.

Example:

```
- Please, Enter a number: 36
- Numbers dividing 36 are: 1, 2, 3, 4, 6, 9, 12, 18, 36
```

Exercise #04:

(Swap.java)

Design and implement a program that will enclose exercises 1, 2 and 3 inside a do-while loop, to make a user choose among the three which ones he wants to execute. The program should show the following menu:

```
1. Exercise 01 - Print
2. Exercise 02 - Summation
3. Exercise 03 - Division
4. Exit
Enter your choice [1, 2, 3, or 4]:
```

When the user inputs 1, he will get the statement **KFUPM IS THE BEST** 10 times and **DHAHRAN** five times. Then the program will print the menu again to ask the user for another input. When the user inputs 2, he will get the value of the summation shown in exercise 2 and so on.

Exercise #05: (Optional)

(Prime.java)

Write a program to print all prime numbers from 2 to a given number, n.

[Hint: to test if a number is prime, use all the smaller numbers, if any of them will divide the current number (i.e. remainder = 0), then it is not prime.]
