

Introduction to Java and looping (Self Review)

Objectives

- To review a basic Java programming
- To review basic For and while loops in Java

Introduction of Java Programming

- A keyword “class” followed by the class name is used to define a class in Java.
- Open and close curly brackets tell the scope of the class.
- Class variables, constructors, and methods are main components inside of a class.
- A variable in Java must have a type and complete with a semi colon (;)
- A constructor in Java must have the same name as the class name followed by round brackets for listing the input requirements and must have no return type.
- A method in Java must specify a return type (or void if it requires no return type). A pair of round brackets for listing the input requirements follows the method name.
- A statement in Java must end with a semicolon (;).
- Below is an example of a class.

Ex.

```
class Circle
{
    int radius;
    Circle() { radius=1; }
    double findArea() {
        return 3.14;
    }
}
```

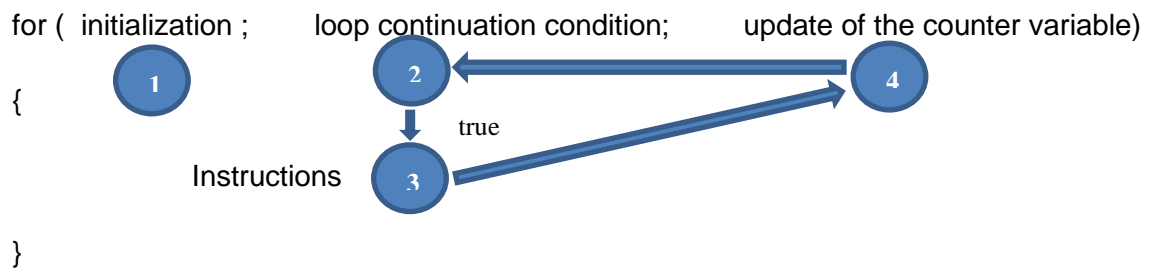
- A class that is runnable when it has a main method

```
public static void main(String [ ] args)
{
}
```

Codes are executed according to instructions in the main method.
- **The “new” Operator** is used for creating an instance of object. The “new” operator is followed by the constructor’s name with a proper argument list. Ex. To create an instance of UnitCircle, we need to write
new UnitCircle();
- The dot operator (.) is used for accessing the properties or methods of the objects
For example
UnitCircle c = new UnitCircle();
- System.out.**println**(arg) and System.out.**print**(arg) prints arg with or without new line after the printout
 - void System.out.println(boolean x)
 - void System.out.println(char x)
 - void System.out.println(int x)
 - void System.out.println(long x)
 - void System.out.println(float x)
 - void System.out.println(double x)
 - void System.out.println(char x[])
 - void System.out.println(String x)
- A double quotes “ ” are used to denote String such as “answer=”.
- A plus sign (+) can be used for concatenation String with String and String with a number
- Comments can be written by adding a double slashes (//) in front of the line. For multiple lines, a pair of /* */ can be used.

A For/ While loop in Java

- A for loop a counter variable.
- It composes of three main steps: initialization of a counter variable; loop continuation condition, instructions, counter variable updates.



After the counter variable is initialized, the loop continuation condition is checked. If it is false, it will exit the loop. If it is true, then it does all instructions, then updates value of the counter variable, and check the loop continuation condition to determine whether or not it should continue.

Examples of a for loop

```
for(int i=0; i<15; i = i+3)
{ System.out.println(i+ " ");
}
```

This for loop produces 0 3 6 9 12

```
for(int i=20; i>6; i = i-5)
{ System.out.println(i+ " ");
}
```

This for loop produces 20 15 10

A While Loop

- A while loop requires a counter variable.
- Similar to a for loop, it composes of three main steps: initialization of a counter variable; loop continuation condition, instructions, counter variable updates.

initialization of a counter variable

while (loop continuation)

{ instructions

counter variable update

}

Example

```
int i=20;

while( i > 6)
{ System.out.println(i+ " ");
  i = i - 5;
}
```

This while loop produces 20 15 10



Exercise 1 Complete a java method that makeMultTable(int M) that produces a multiplication table shown in this form.

```
X  M
1  M
2  2M
...
12 12M
```

Check your answer by uncommenting a self-checking block of codes of Ex1 in the main method.



Exercise 2 Complete the method deductK(int M, int k) that generates a sequence of positive numbers M M-k M-2k M-3k Check your answer by uncommenting a self-checking block of codes of Ex2 in the main method.



Exercise 3 Complete the method makeUpwardRightTriangle(int w) that generates an upward right triangle of width w made by * characters.

An example of output when w = 4 is as follows.

```
*
**
***
****
```

Check your answer by uncommenting a self-checking block of codes of Ex3 in the main method.



Exercise 4 Complete the method makeDownwardRightTriangle(int w) that generates a downward right triangle of width w made by * characters.

An example of output when w = 4 is as follows.

```
****
***
**
*
```

Check your answer by uncommenting a self-checking block of codes of Ex4 in the main method.



Exercise 5 Complete the method makeUpwardIsosceles(int w) that generates an upward isosceles of width 2w+1 made by * characters.

The shape of the output when w = 4 is as follows.

```
*  
  
***  
  
*****  
  
*****  
  
*****
```

Check your answer by uncommenting a self-checking block of codes of Ex5 in the main method.