

Batch: D2 Roll No.: 16010122323

Experiment / assignment / tutorial No. 02

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

TITLE: Control Statement

AIM: Create a class myMath. The class contains the following static methods.

- i) power (x, y) – to compute x^y
- ii) fact (x) – to compute $x!$

Write a program to find the following series.

- $\cos(x) = 1 - (x^2/2!) + (x^4/4!) - (x^6/6!) + \dots$ upto n terms (n given by user).
- $\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \dots$ upto n terms (n given by user).

(Do not make use of inbuilt functions. Use the functions of user defined class MyMath.)

Expected OUTCOME of Experiment:

CO2: Explore arrays, vectors, classes and objects in C++ and Java.

Books/ Journals/ Websites referred:

1. Ralph Bravaco , Shai Simoson , “Java Programing From the Group Up” Tata McGraw-Hill.
2. Grady Booch, Object Oriented Analysis and Design .

Pre Lab/ Prior Concepts

Java basic constructs (like if else statement, control structures, and data types

Programming languages provide various control structures that allow for more complicated execution paths.

A loop statement allows us to execute a statement or group of statements multiple times and following is the general form of a loop statement in most of the programming languages –

Sr.No.	Loop & Description
1	<p><u>while loop</u></p> <p>Repeats a statement or group of statements while a given condition is true. It tests the condition before executing the loop body.</p>
2	<p><u>for loop</u></p> <p>Execute a sequence of statements multiple times and abbreviates the code that manages the loop variable.</p>
3	<p><u>do...while loop</u></p> <p>Like a while statement, except that it tests the condition at the end of the loop body.</p>

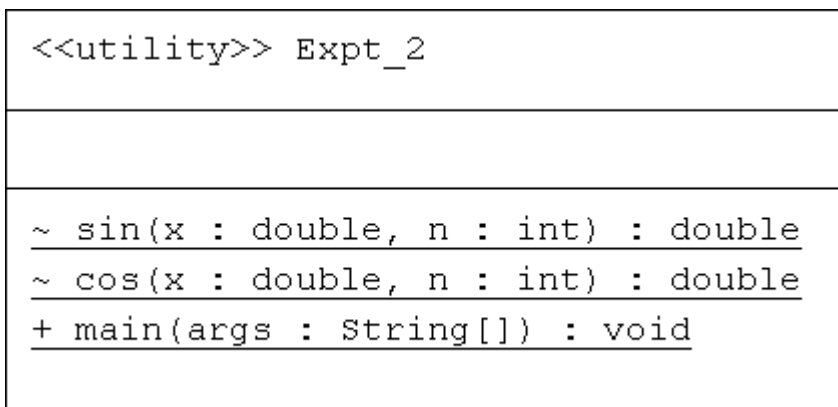
Loop Control Statements

Loop control statements change execution from its normal sequence. When execution leaves a scope, all automatic objects that were created in that scope are destroyed.

Java supports the following control statements. Click the following links to check their detail.

Sr.No.	Control Statement & Description
1	<p><u>break statement</u></p> <p>Terminates the loop or switch statement and transfers execution to the statement immediately following the loop or switch.</p>
2	<p><u>continue statement</u></p> <p>Causes the loop to skip the remainder of its body and immediately retest its condition prior to reiterating.</p>

Class Diagram:



Algorithm:

1. Start
2. Create a custom class MyMath.
3. Define static method power which takes two integer arguments x and y.
4. Define pow = 1 initially.
5. Multiply pow by x until x is less than y.
6. Define static method fact which takes one integer argument.
7. Define double fact =1 and int i =1.
8. Multiply fact by i and add 1 to i each time until i is less than equal to x.
9. Define the main class Expt_2.
10. Define static method sin which takes two arguments double and int.
11. Define int i and m and double ans, p, f, a.
12. Find power, factorial by methods defined above.
13. Now the ans is equal is ans+(a*p/f)
14. Repeat step 13 until i is less than n.
15. Return the answer.
16. Define static method cos which takes two arguments double and int.
17. Repeat step 11 with m = 0 and 12.
18. Now the ans is equal is ans+(a*p/f)
19. Repeat step 13 until i is less than n.
20. Return the answer.
21. Get number and range upto which series is to be calculated.
22. Print sin and cos of the given number upto range specified by user.
23. Exit

Implementation details:

```
package com.oopm;

import java.util.Scanner;

//Custom Class MyMath

class MyMath {

    //Method to find power

    static double power(double x,int y){

        double pow=1;

        for (int i=1;i<=y;i++){

            pow = pow*x;

        }

        return pow;

    }

    //Method to find factorial

    static double fact(int x){

        double fac=1;

        for (int i=1;i<=x;i++){

            fac=fac*i;

        }

        return fac;

    }

}

public class Expt_2 {

    //Method to calculate cos

    static double sin(double x, int n)

    {

        int i,m=1;
```

```
double ans = 0,p,f,a;

for(i=0;i<n;i++)

{

    p=MyMath.power(x,m);

    f = MyMath.fact(m);

    a = MyMath.power(-1, i);

    ans = ans + (a*p)/f;

    m=m+2;

}

return ans;

}

//Method to calculate cos

static double cos(double x, int n)

{

    int i,m=0;

    double ans = 0,p,f,a;

    for(i=0;i<n;i++)

    {

        p=MyMath.power(x,m);

        f = MyMath.fact(m);

        a = MyMath.power(-1, i);

        ans = ans + (a*p)/f;

        m=m+2;

    }

    return ans;

}

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

```
Scanner sc = new Scanner(System.in);

System.out.print("Enter the number : ");

double x = sc.nextDouble();

System.out.print("Enter the range : ");

int n = sc.nextInt();

System.out.println("sin "+x+" = "+sin(x,n));

System.out.println("cos "+x+" = "+cos(x,n));

}

}
```

Output:

```
Enter the number : 30
Enter the range : 5
sin 30.0 = 5.089981571428571E7
cos 30.0 = 1.529312242857143E7
```

Conclusion:

The aim of the experiment is verified.

Post Lab Descriptive Questions

Q.1 What will be the output of the following program?

```
class Test {
    static String s = "";
public
    static void main(String[] args)
    {
        P:
```

```
for (int i = 2; i < 7; i++) {  
    if (i == 3)  
        continue;  
    if (i == 5)  
        break P;  
    s = s + i;  
}  
System.out.println(s);  
}
```

1. 32
2. 23
- 3. 24**
4. 42

ANS : 24

Q.2 What will be the output of the following program?

```
class Test {  
public  
    static void main(String[] args)  
    {  
        int x = 10;  
        if (++x < 10 && (x / 0 > 10)) {  
            System.out.println("hi");  
        } else {  
            System.out.println("hello");  
        }  
    }  
}
```

1. Compiletimeerror
2. RuntimeException:ArithmeticException:/byzero
3. Hi
4. Hello

ANS : Hello