Department of Computer Science

Final Term Exam Spring 2020

Subject: Object Oriented Programming (Lab)

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There are total **5** questions in this paper.

Note:

At the top of the answer sheet there must be the ID, Name and semester of the concerned Student.

Students must have to provide the output of their respective programs. Students have same answers or programs will be considered fail. Programs in Java or codes should be explained clearly.

As this paper is online so incase of any ambiguity my Whatsapp no. is 034499121116.

Each question carry equal marks.
Please answer briefly.

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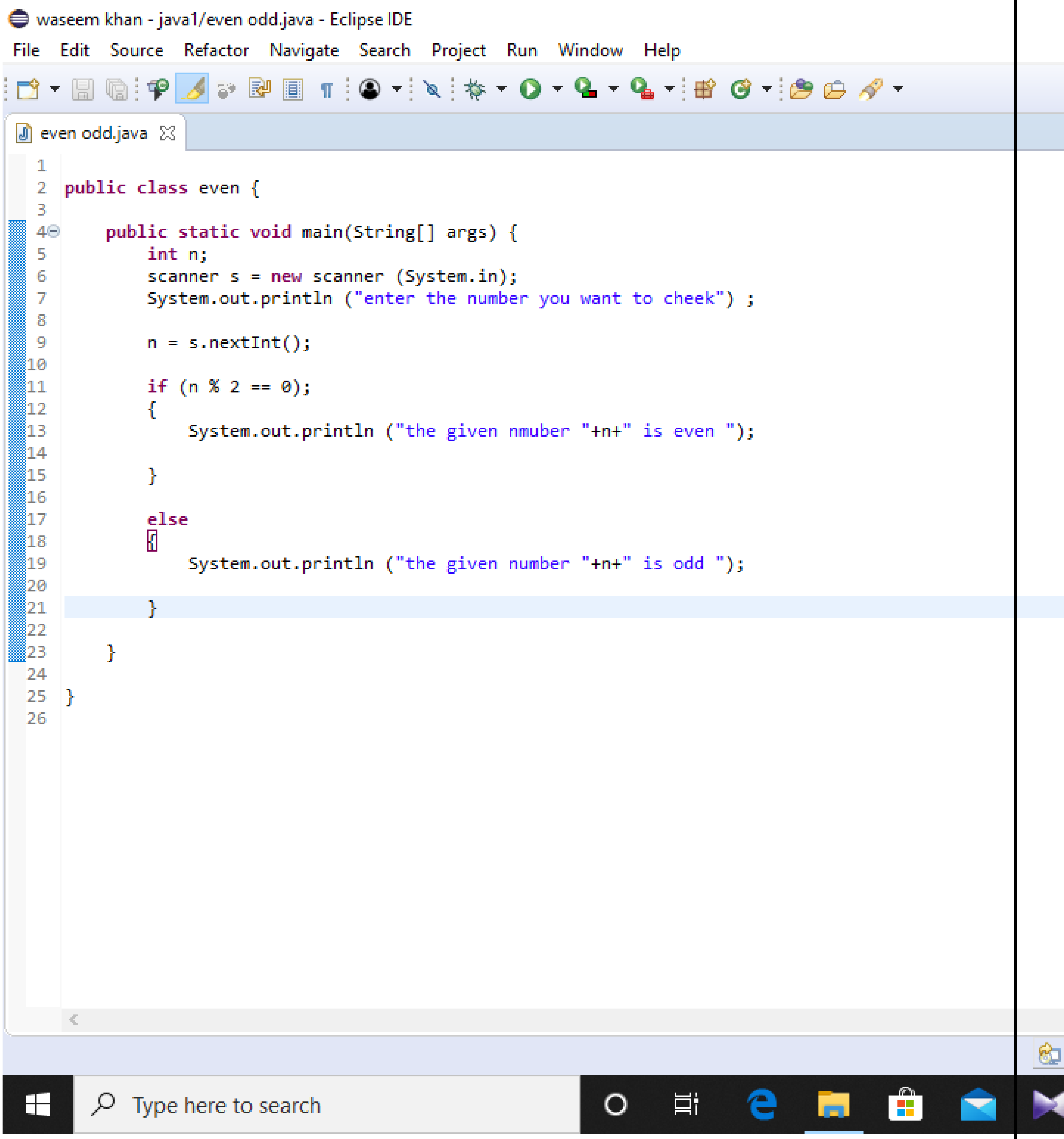
Q1. How to check Even and Odd numbers in java using object oriented approach?

ANS

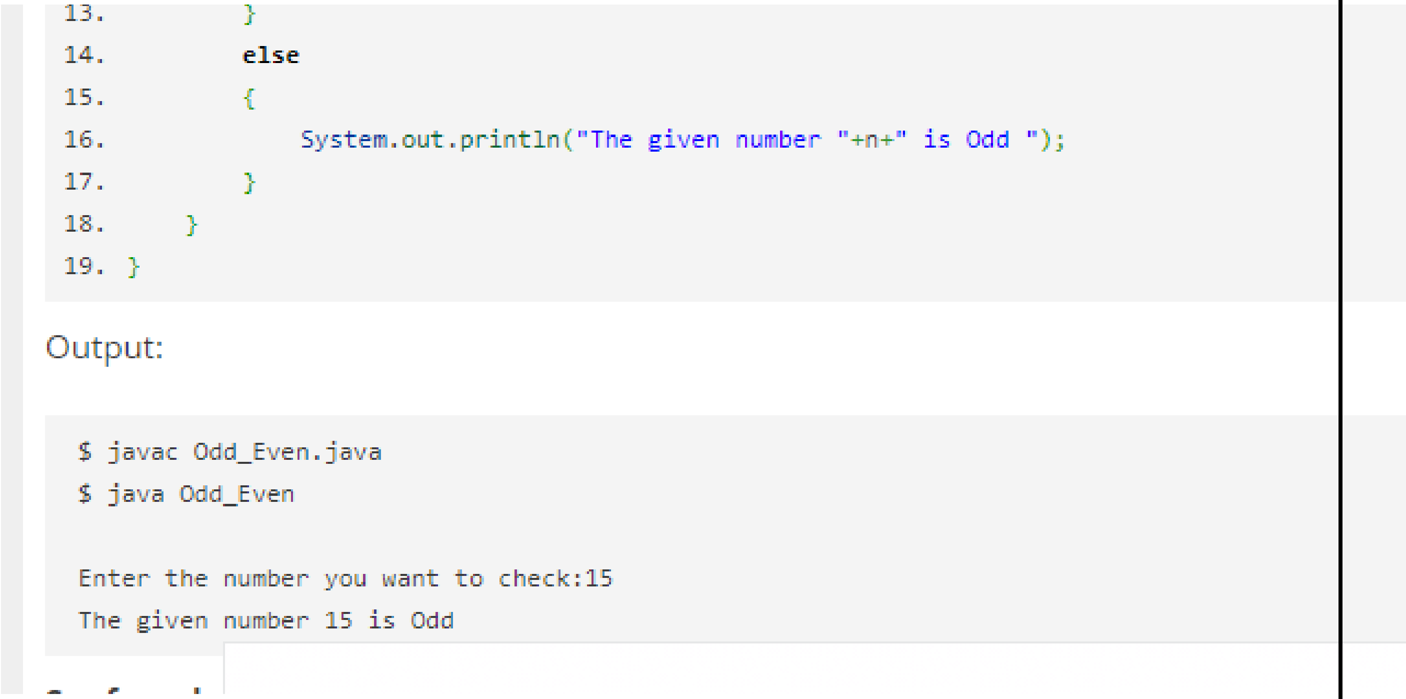
Java Program to Check if a Given Integer is Odd or Even

1. public class Odd_Even.
2. int n;

3. Scanner s = new Scanner(System.
4. System. out. print("Enter the number you want to check:");
5. n = s. nextInt();
6. if(n % 2 == 0)
7. System. out. println("The given number "+n+" is Even ");
8. System. out. println("The given number "+n+" is Odd ");



```java

public class even {

    public static void main(String[] args) {
        int n;
        scanner s = new scanner (System.in);
        System.out.println ("enter the number you want to cheek") ;

        n = s.nextInt();

        if (n % 2 == 0);
        {
            System.out.println ("the given nmuber "+n+" is even ");

        }

        else
        {
            System.out.println ("the given number "+n+" is odd ");

        }

    }

}

```



```
        }
        else
        {
            System.out.println("The given number "+n+" is Odd ");
        }
    }
}
```

Output:

```
$ javac Odd_Even.java
$ java Odd_Even

Enter the number you want to check:15
The given number 15 is Odd
```

==

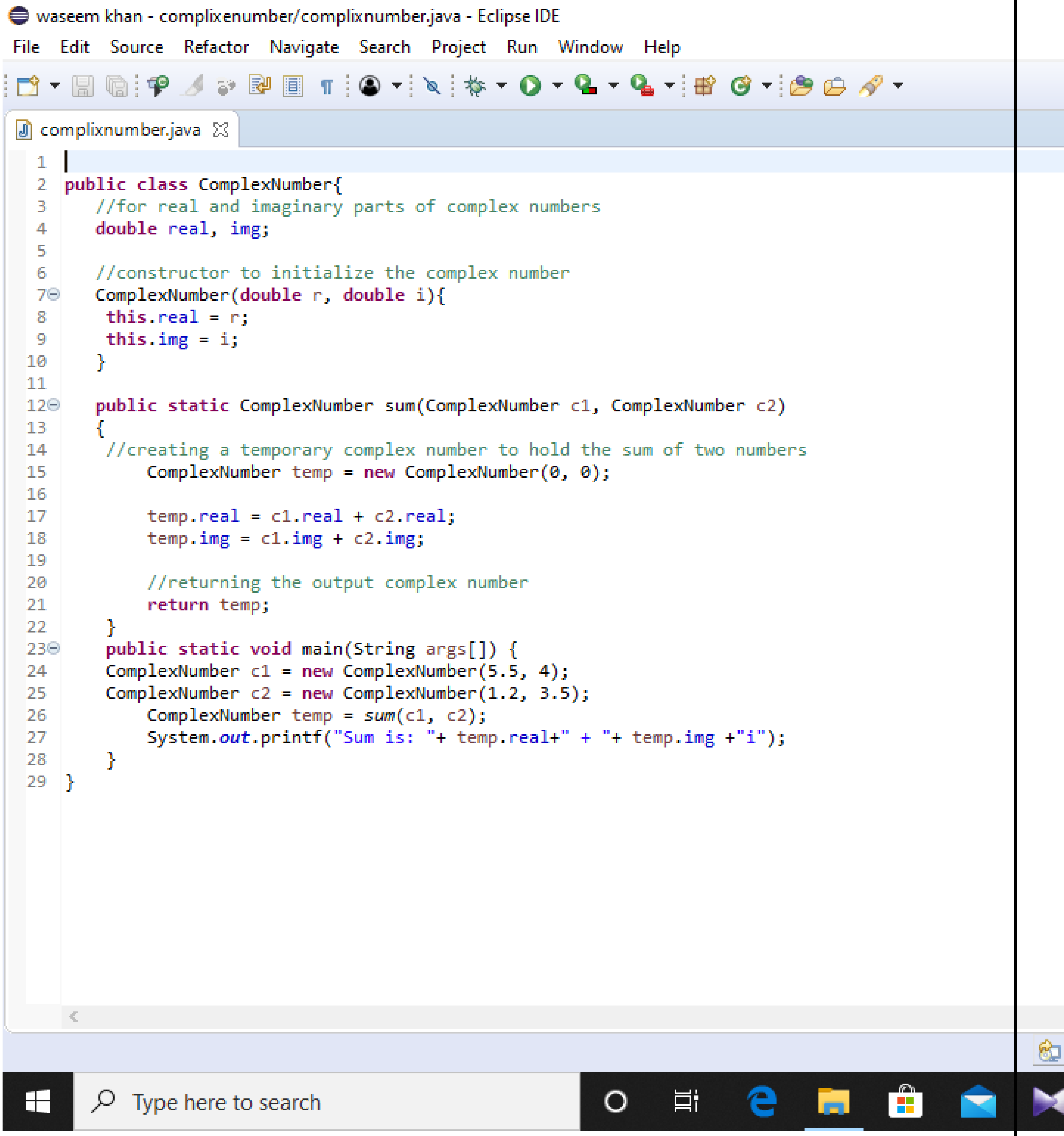
Q2. How to add 2 complex numbers in java using object oriented approach?

ANS

1. To add or subtract two complex numbers,
2. just add or subtract thecorresponding real and imaginary parts.

3. For instance, the sum of 5 + 3i and 4 + 2i is 9 + 5i. For another,
4. the sum of 3 + i and –1 + 2i is 2 + 3i.

5. Addition can be represented graphically on the complex plane C.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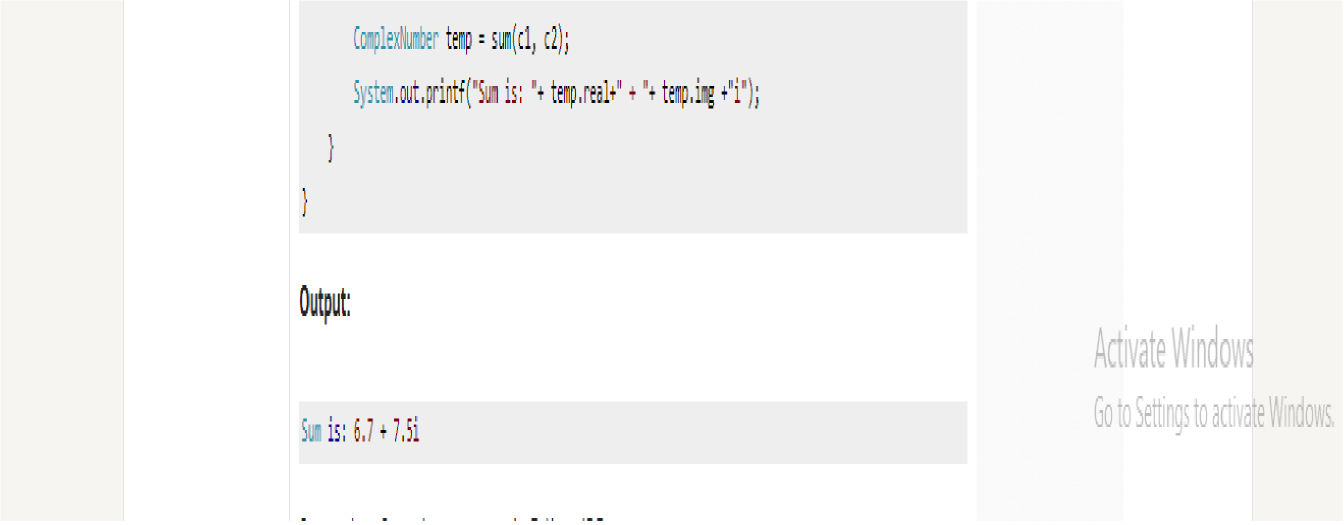
```

public class ComplexNumber{
   //for real and imaginary parts of complex numbers
   double real, img;

   //constructor to initialize the complex number
   ComplexNumber(double r, double i){
    this.real = r;
    this.img = i;
   }

   public static ComplexNumber sum(ComplexNumber c1, ComplexNumber c2)
   {
    //creating a temporary complex number to hold the sum of two numbers
        ComplexNumber temp = new ComplexNumber(0, 0);

        temp.real = c1.real + c2.real;
        temp.img = c1.img + c2.img;

        //returning the output complex number
        return temp;
    }
    public static void main(String args[]) {
    ComplexNumber c1 = new ComplexNumber(5.5, 4);
    ComplexNumber c2 = new ComplexNumber(1.2, 3.5);
        ComplexNumber temp = sum(c1, c2);
        System.out.printf("Sum is: "+ temp.real+" + "+ temp.img +"i");
    }
}
```



```
        ComplexNumber temp = sum(c1, c2);

        System.out.printf("Sum is: "+ temp.real+" + "+ temp.img +"i");

    }

}
```

Output:

```
Sum is: 6.7 + 7.5i
```

==

Q3. How to check Leap year in java using object oriented approach?

ANS

1 import java. util. Scanner; class Leapyear. ...

1. public static void main(String arg[]) {
2. if(year!=0) { if(year%400==0)
3. System. out. println(year+" is a leap year"); else if(year%100==0) ...
4. else if(year%4==0) System. out. ...
5. System. out. println(year+" is not a leap year"); ...
6. System. out. println("Year zero does not exist ");

Java Program To Check Leap Year Or Not – 4 Ways

Java Program To Check Leap Year Or Not – 4 Ways

Java Program to find if a year is a leap or not. Here, we see the various methods to find out whether a year is Leap or not in Java In 5 different ways.

Soon Compiler is added so that you can execute the program yourself, along with suitable examples and sample outputs. The methods used in this case are:

- Using Ternary Operator.
- Using Static Method.
- Using Command Line Arguments.
- Using Function.
- Using If-Else.

Using Ternary Operator

1) The ternary operator syntax is "if (condition)? value1:value2;", if the condition is true then it returns value1, otherwise it returns value2.

2) We are calculating the given year is a leap year or not. A year divisible by 400 (or) a year divisible by 4 and not divisible by 100 is a leap year.

3) Read the year value using scanner object sc.nextLong and store it in the variable y.
In given example y=1948, y!=0, it is divisible by 400 so c=1 return to a, a is initialized as a=1. Then it prints 1948 is a leap year.

Using Static Method

1) In this program leapOrNot(long year) is the static method which finds the given year is a leap year or not. leapOrNot(long year) method calls at the main method of the class Leapyear. Then that static method starts the execution.

a) If the year divisible by 400 then it prints the given year is leap(or) If the given year divisible by 4 and not divisible by 100 then it prints the given year is a leap.

b) Otherwise, it prints "year is not a leap year".

Using Command Line Arguments

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1) We can read command line arguments from "String args[]" of the main method.

convert the year which is in yhe string format at arg[0], in to int using year = intger . parseint (arg[0]) . integer is the wrapper class which convert the string into int data type .
(A) if the year divisbale by 400 then it ptints the given year is leap it the given year divisable by 4 and not divisable 100 then prints the given year is a leap .

(B) otherwise , it prints “uear is not a leap year .

Java Leap Year Or Not – Using Function

1) The leap(int year) function returns c=1 if the given year is a)divisible by 400 or b) divisible by 4 and not divisible by 100.

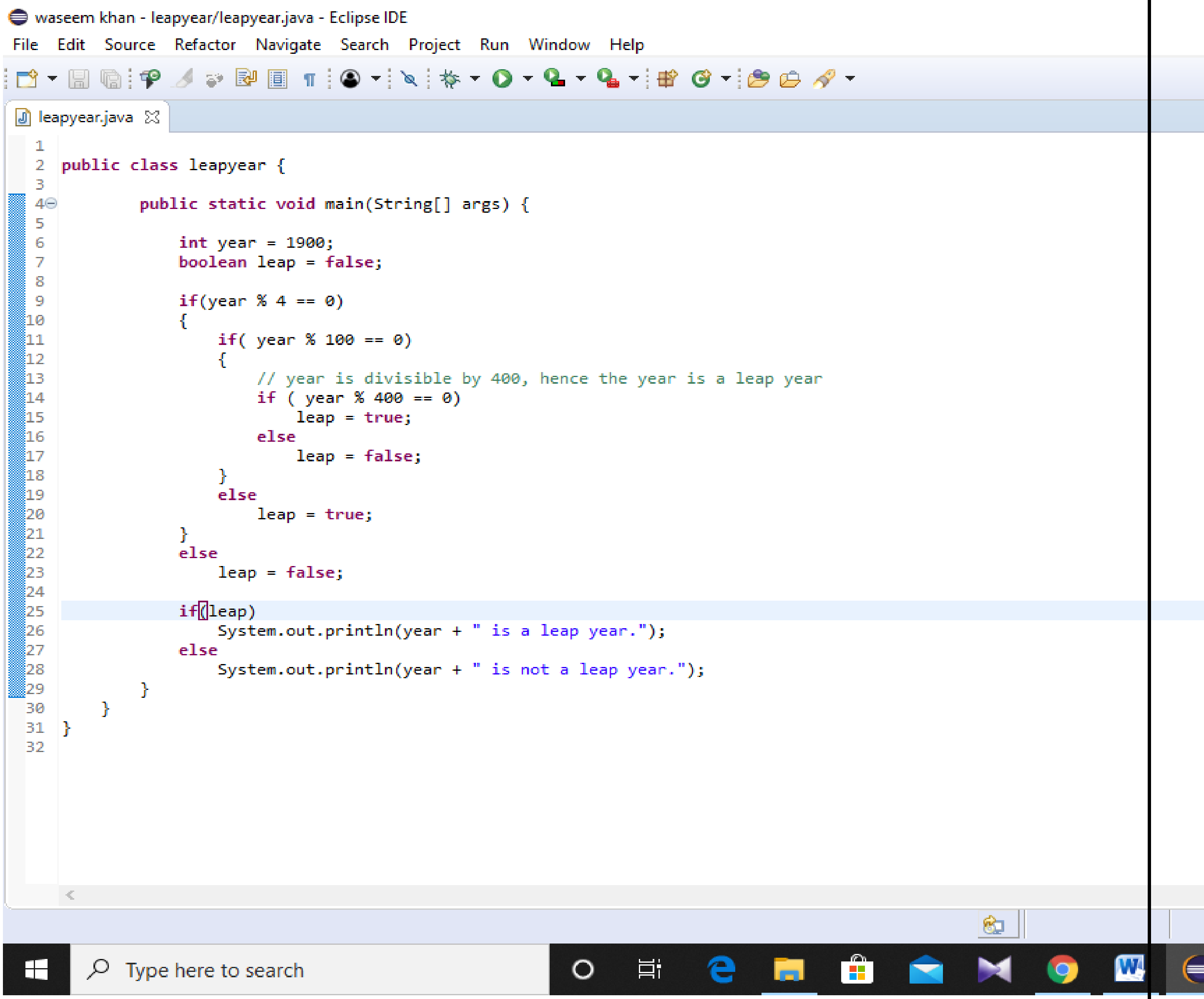
2) The function calls at the main method if year!=0, then it returns the c value and c value initialized to the variable “a” if a=1 then prints “is a leap year” otherwise prints “not a leap year”.

Using If-Else

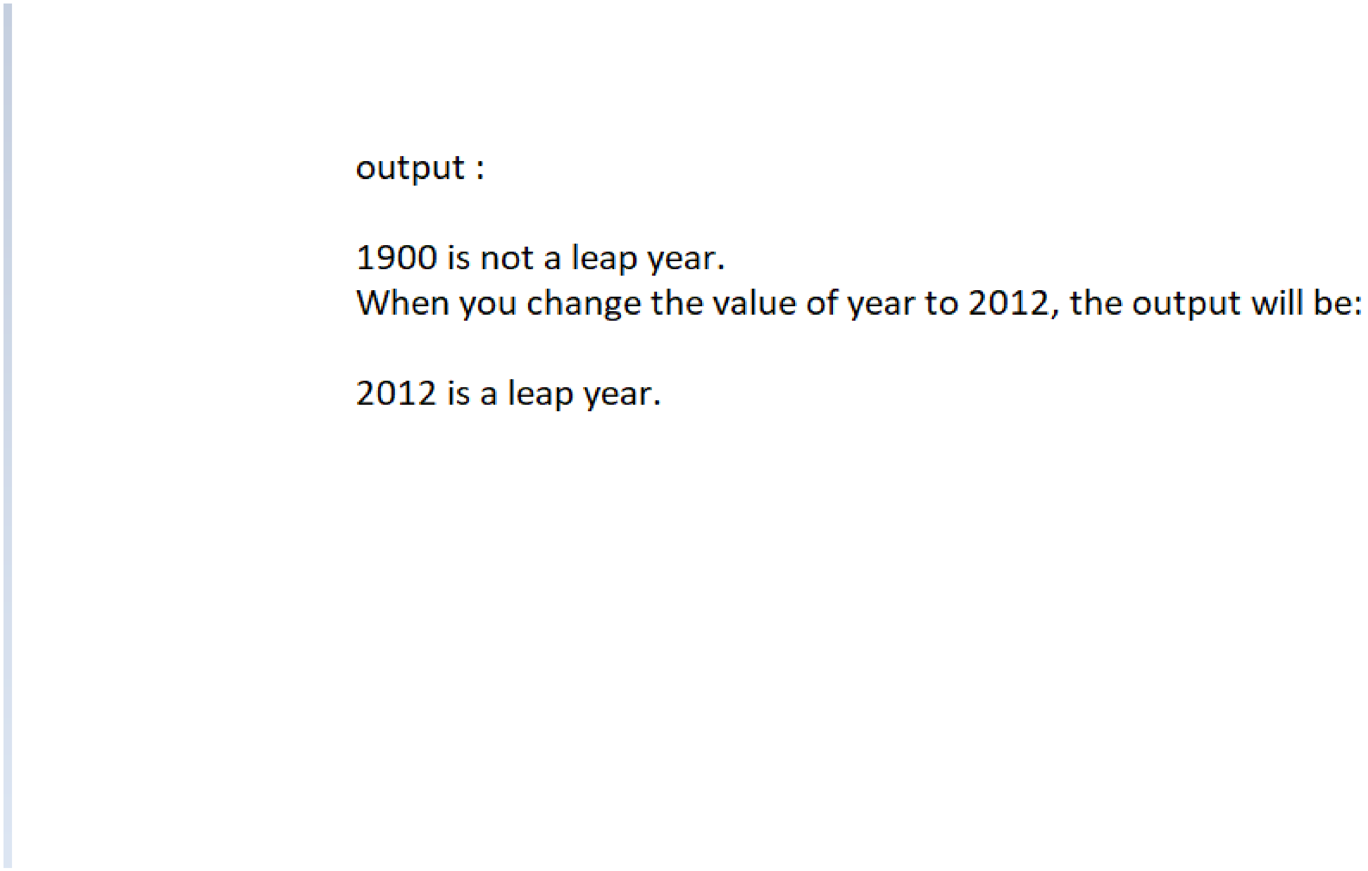
1) We are using if else condition to find the given year is a leap year or not.

2) The 1st if condition checks the given year is equal to zero or not, if not

a) If given year divisible by 400 it prints “is a leap year”, if condition false then come to else part.
b) If given year divisible by 100, then inner if condition checks the year is divisible by 4 or not if true then prints “is a leap year” otherwise prints “is not a leap year. If condition if(year%100!=0) is false then it prints “is not a leap year”



```java

public class leapyear {

        public static void main(String[] args) {

            int year = 1900;
            boolean leap = false;

            if(year % 4 == 0)
            {
                if( year % 100 == 0)
                {
                    // year is divisible by 400, hence the year is a leap year
                    if ( year % 400 == 0)
                        leap = true;
                    else
                        leap = false;
                }
                else
                    leap = true;
            }
            else
                leap = false;

            if(leap)
                System.out.println(year + " is a leap year.");
            else
                System.out.println(year + " is not a leap year.");
        }
    }
}

```



output :

```
1900 is not a leap year.
When you change the value of year to 2012, the output will be:

2012 is a leap year.
```

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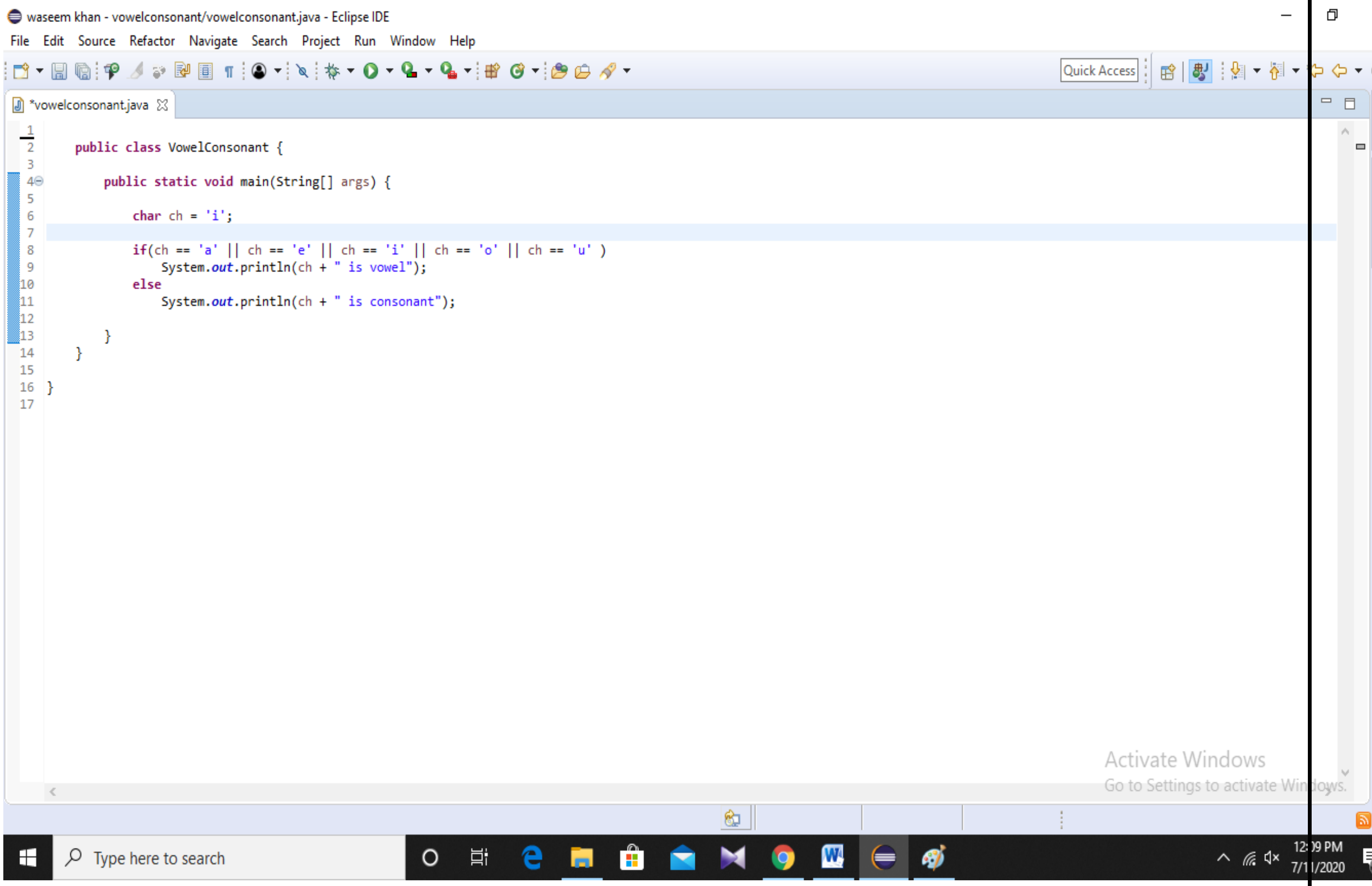
Q4. How to check that the input from the user is the vowel or not in java using object oriented approach?

Ans

Check whether an alphabet is vowel or consonant using if..else statement .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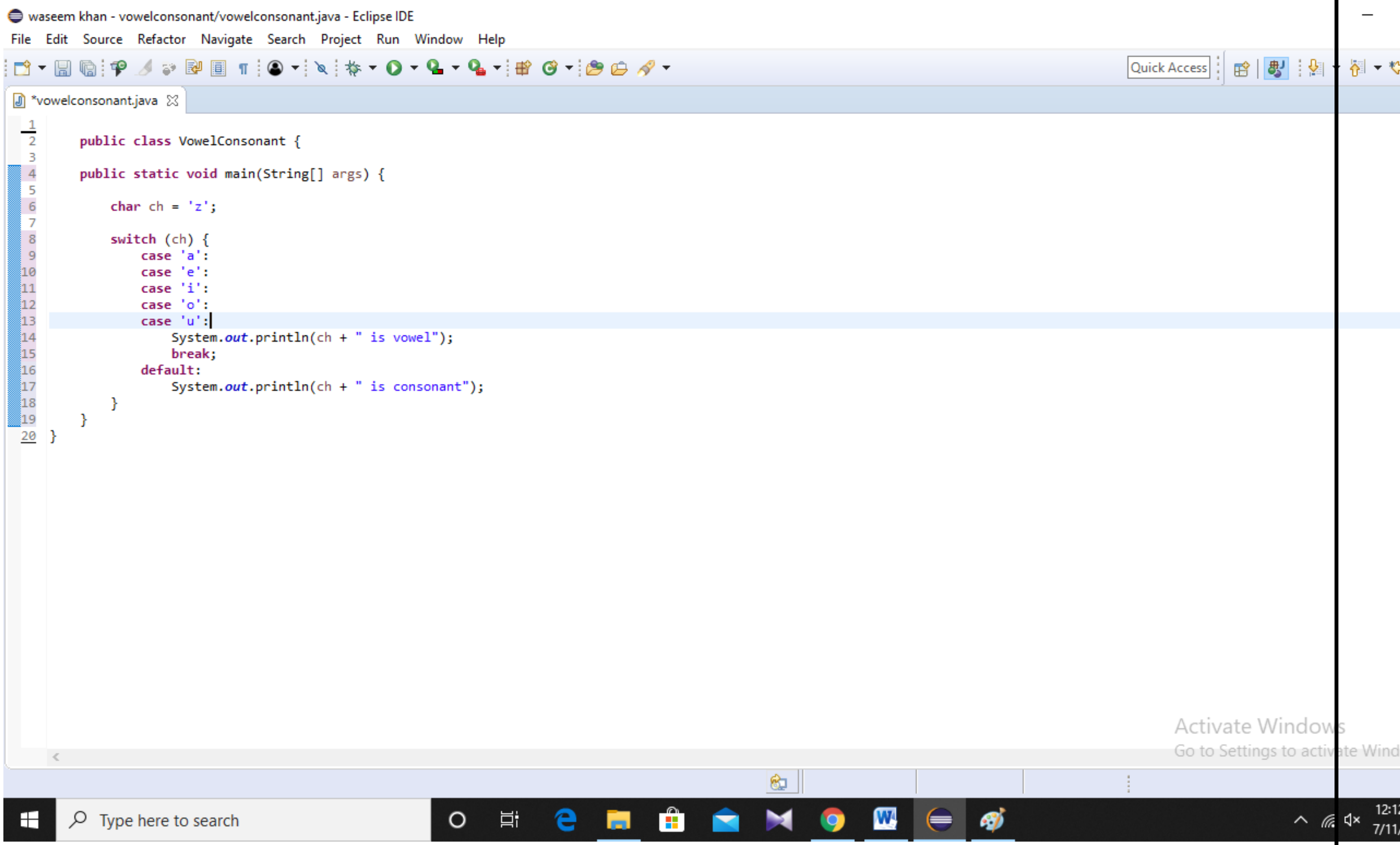
```java

    public class VowelConsonant {

        public static void main(String[] args) {

            char ch = 'i';

            if(ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u' )
                System.out.println(ch + " is vowel");
            else
                System.out.println(ch + " is consonant");

        }
    }

}
```

in the above program, `'i'` is stored in a char variable `ch`. In Java, you use double quotes `(" ")` for strings and single quotes `(' ')` for characters.

Now, to check whether `ch` is vowel or not, we check if `ch` is any of: `('a', 'e', 'i', 'o', 'u')`. This is done using a simple `if..else` statement.

We can also check for vowel or consonant using a switch statement in Java.

Check whether an alphabet is vowel or consonant using switch statement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```java

    public class VowelConsonant {

    public static void main(String[] args) {

        char ch = 'z';

        switch (ch) {
            case 'a':
            case 'e':
            case 'i':
            case 'o':
            case 'u':
                System.out.println(ch + " is vowel");
                break;
            default:
                System.out.println(ch + " is consonant");
        }
    }
}
```

In the above program, instead of using a long `if` condition, we replace it with a `switch case` statement.

If `ch` is either of cases: `('a', 'e', 'i', 'o', 'u')`, vowel is printed.

Else, `default` case is executed and consonant is printed on the screen.

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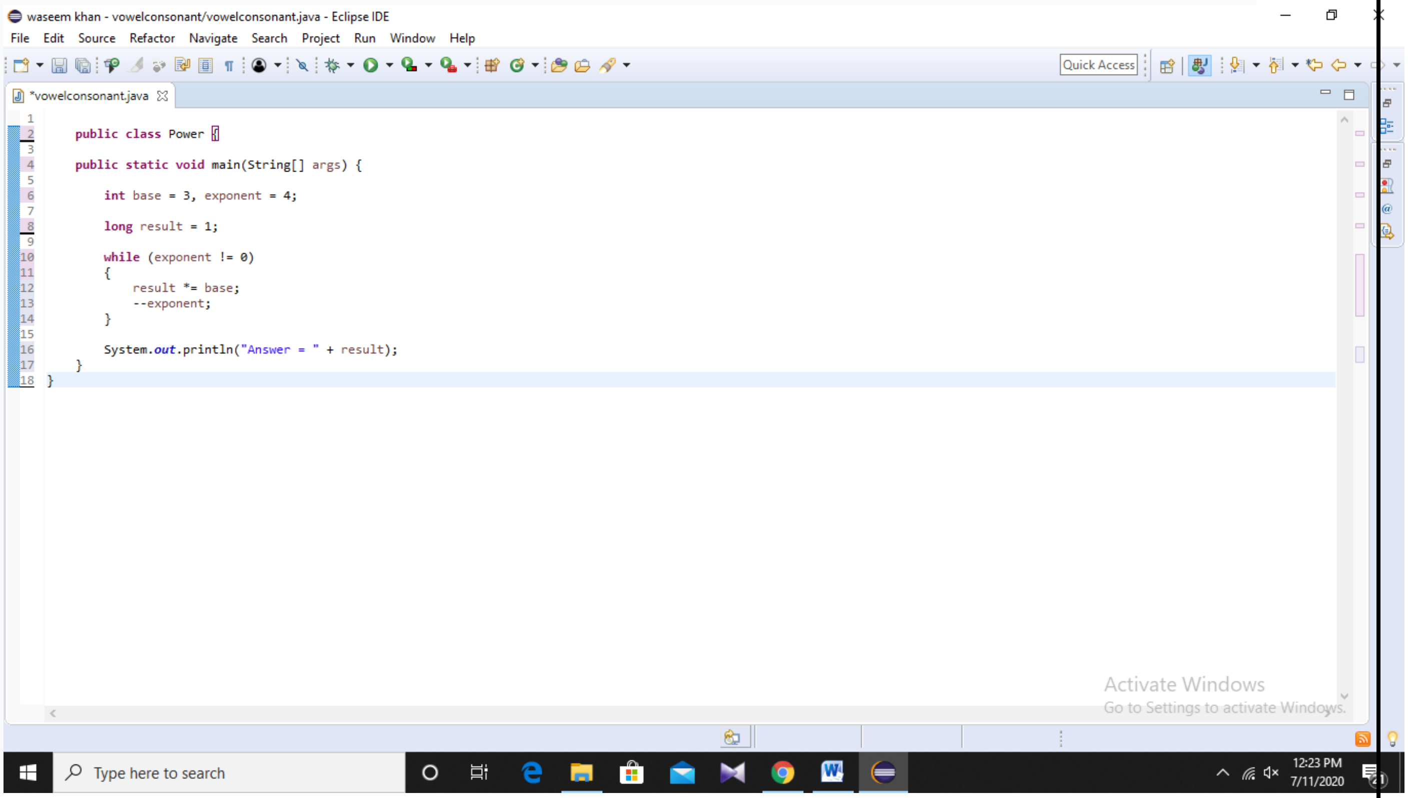
Q5. How to use power of a number in java using object oriented approach?

Ans

===

Calculate power of a number using a while loop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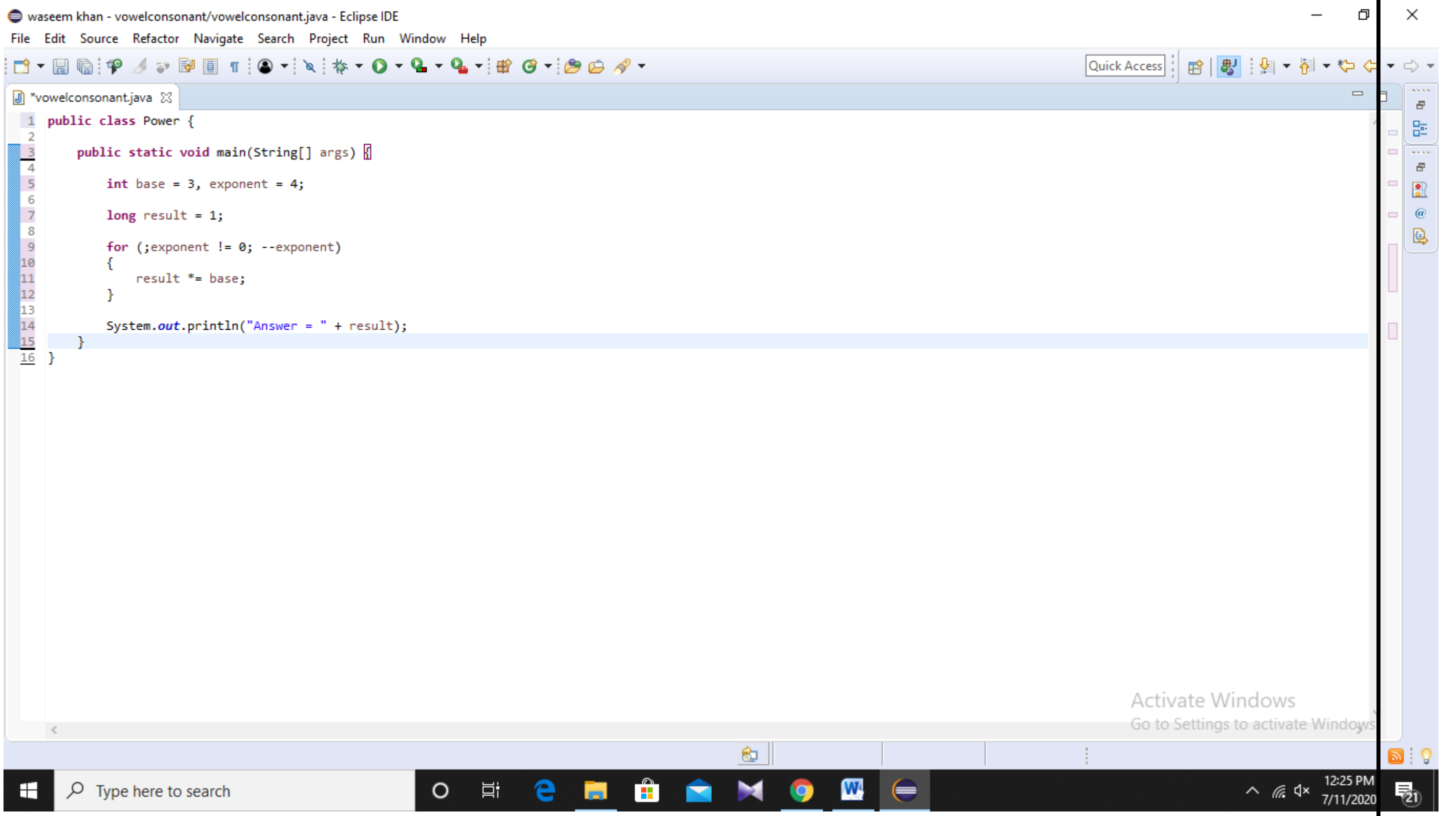
```

    public class Power {

    public static void main(String[] args) {

        int base = 3, exponent = 4;

        long result = 1;

        while (exponent != 0)
        {
            result *= base;
            --exponent;
        }

        System.out.println("Answer = " + result);
    }
}
```

==

Calculate power of a number using a for loop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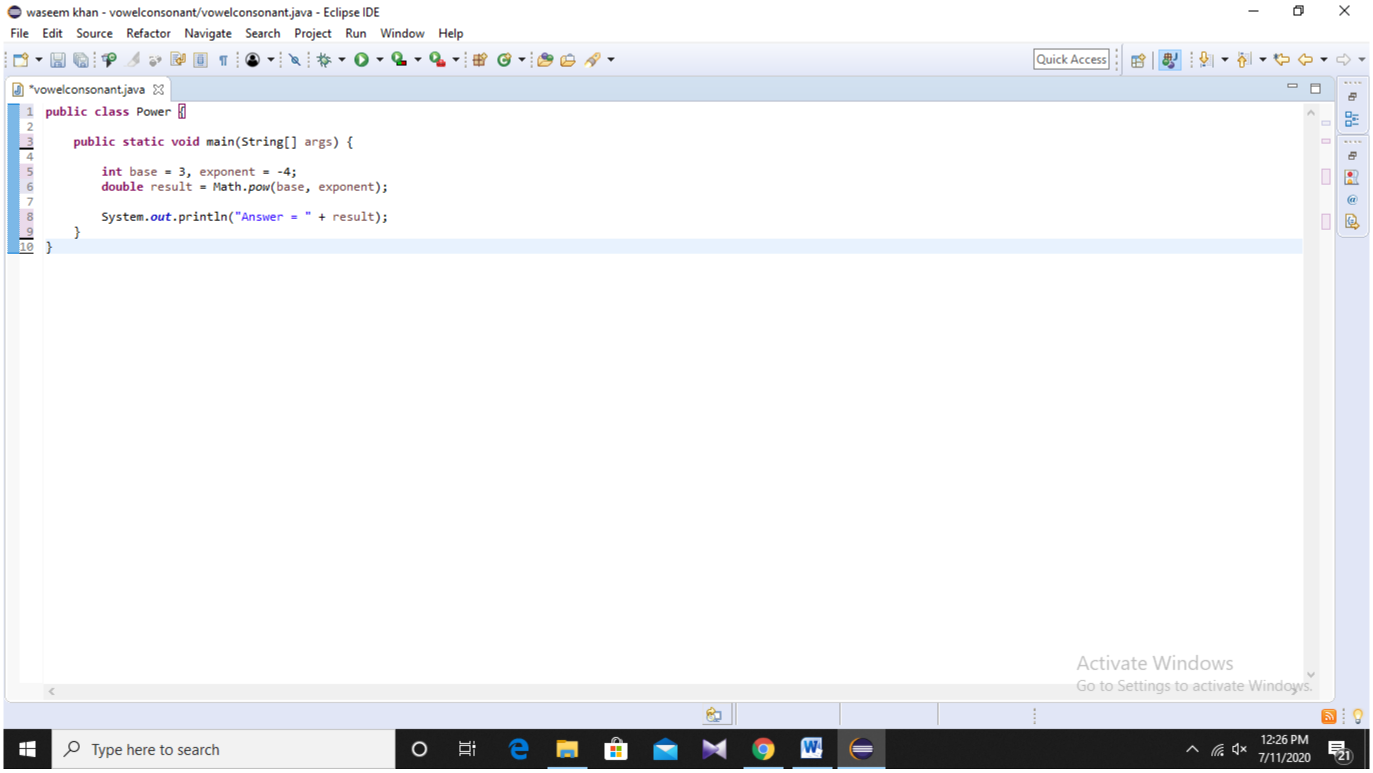
```java
public class Power {

    public static void main(String[] args) {

        int base = 3, exponent = 4;

        long result = 1;

        for (;exponent != 0; --exponent)
        {
            result *= base;
        }

        System.out.println("Answer = " + result);
    }
}
```

===

Calculate the power of a number using pow() function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```java
public class Power {

    public static void main(String[] args) {

        int base = 3, exponent = -4;
        double result = Math.pow(base, exponent);

        System.out.println("Answer = " + result);
    }
}
```

Even though the Java library has a power function, `Math.pow()`, to calculate the power of a given number in Java, it's a regular programming exercise for Java programmers to implement a power function.

If you have used the Math class, then you know that the `java.lang.Math.pow(double a, double b)` returns the value of the first number raised to the power of the second number and you need to do the same. In other words, you need to write a Java function to calculate the power of integer numbers for simplicity.

The original method accepts a binary value, but you are allowed to use just integer, but beware that power function may overflow.

Problem:

Write a function in Java to calculate the power of integers.

Method Signature: `power(int x, int y)`

Purpose: Function should return the power of x^y

Input: `power(2, 3)` shouls return 8

Here is another definition of Power function from Maths perspective just in case if you re interested.

Java Program to Calculate Power of X to Y:

You can solve this problem by writing a function that just multiplies a given number to itself by a given amount of times.

For example, if `power(x, y)`, you can return the value of x multiplied by itself y number of times.

Analysis and Explanation of Logic:

This problem is very similar to another famous coding problems, the power of two, which we discussed earlier.

In that problem, I have shown you two ways, one using multiplication and other using a bitwise operator because it was the power of two, and the left shift is equal to multiplying by two.

Java Program to calculate the power of a number in Java

Here is our complete Java Program to calculate the power of x to y. In order to do that, we have created a Java method `pow(x, y),` which returns x to the power y.
This is a static method because code is not dependent upon any state. All the thing code needs to calculate power is coming via function parameters.