SCHOOL OF
COMPUTING

VAISHNAV H

CH.SC.U4CSE24049

OBJECT ORIENTED PROGRAMMING (23CSE111)

LAB RECORD

AMRITA VISHWA VIDYAPEETHAM

AMRITA SCHOOL OF COMPUTING, CHENNAI

BONAFIDE CERTIFICATE

This is to certify that the Lab Record work for 23CSE111- Object Oriented Programming Subject submitted by ***CH.SC.U4CSE24049 – VAISHNAV H*** in **"Computer Science and Engineering"** is a Bonafide record of the work carried out under my guidance and supervision at Amrita School of Computing, Chennai.

This Lab examination held on 11/03/2025

Internal Examiner 1 Internal Examiner 2

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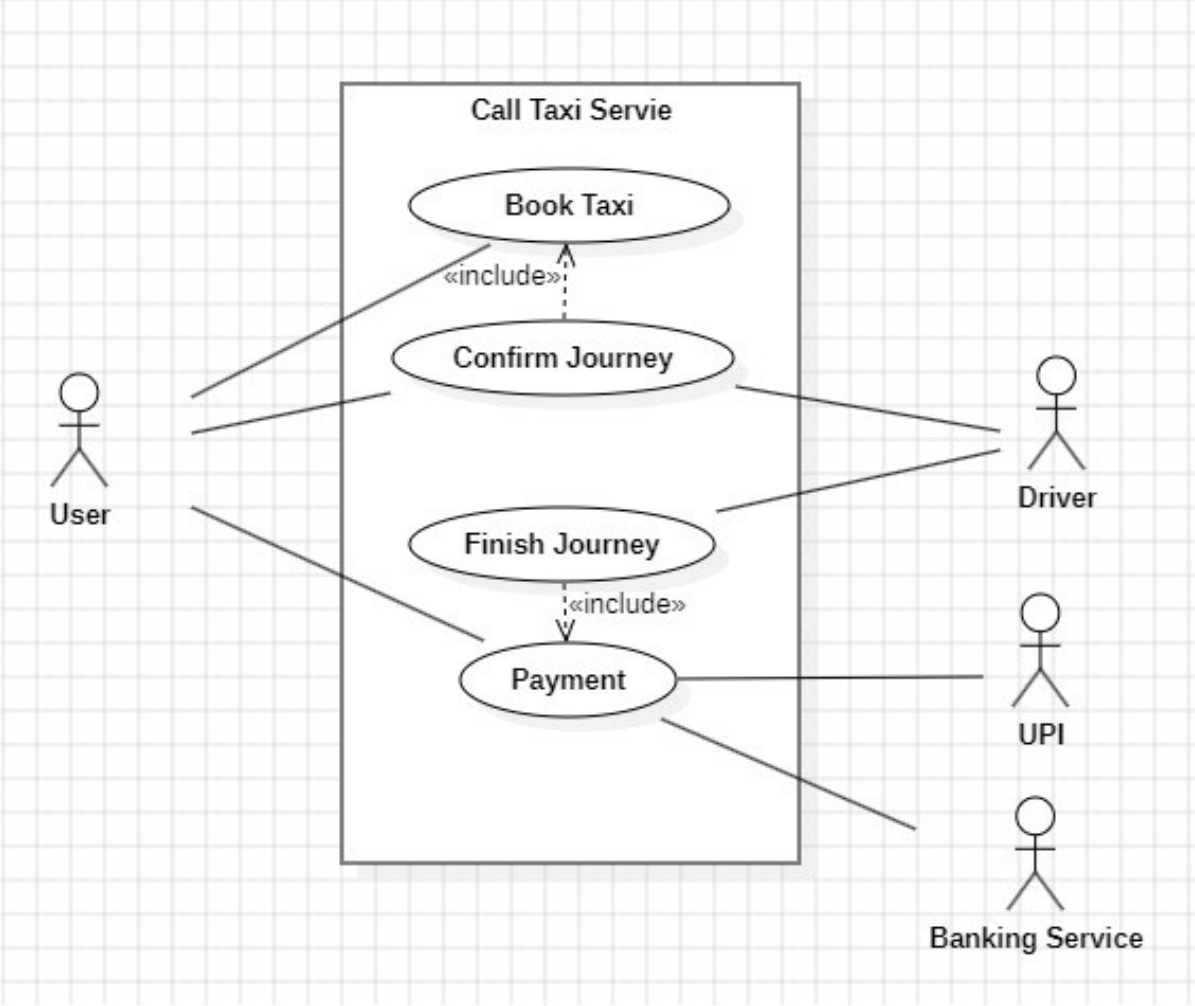
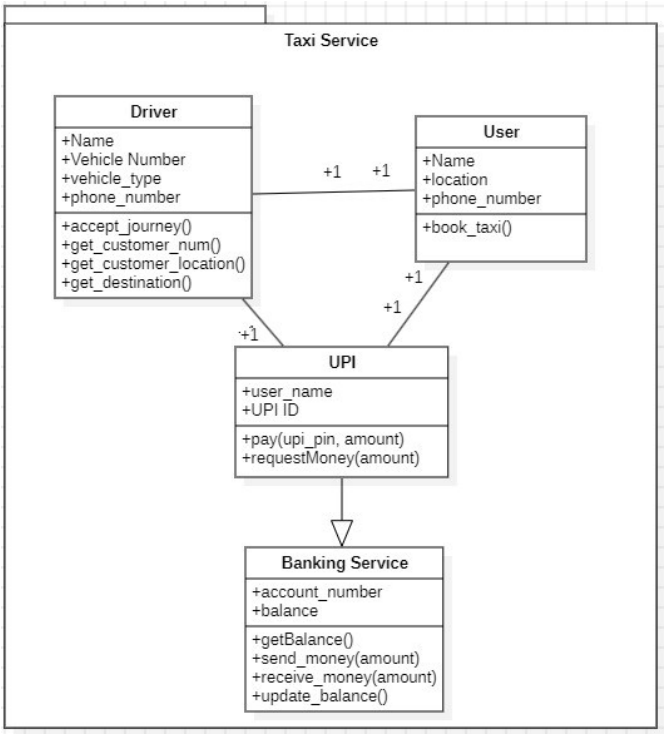
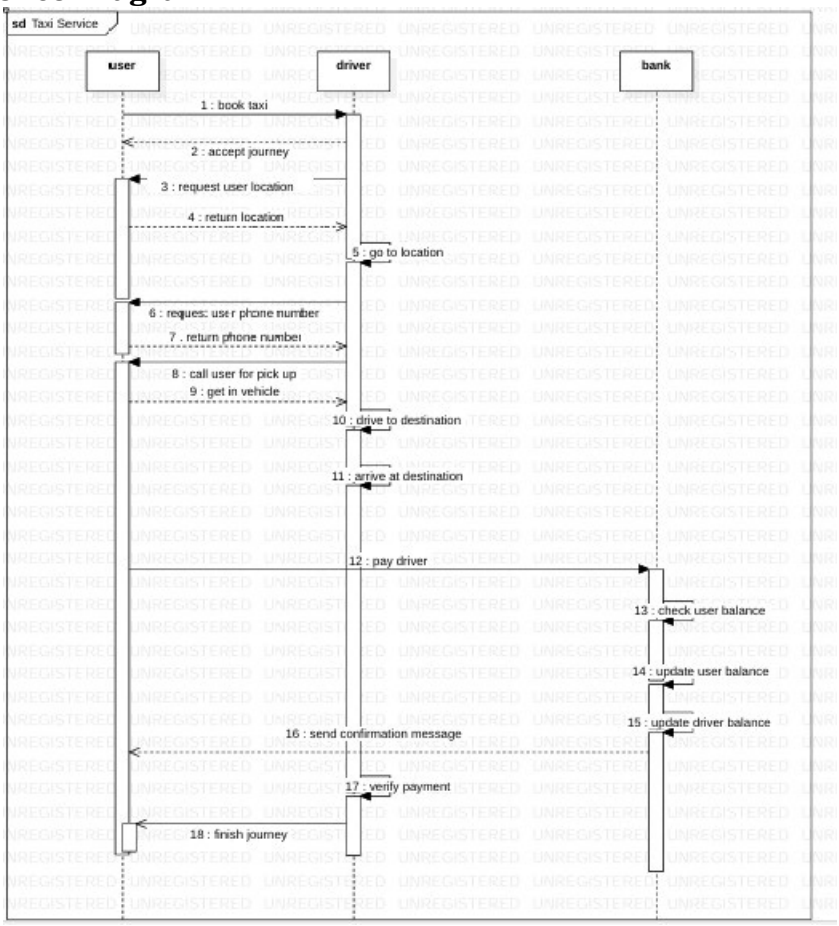


1.b) Class Diagram:



1.c) Sequence Diagram:



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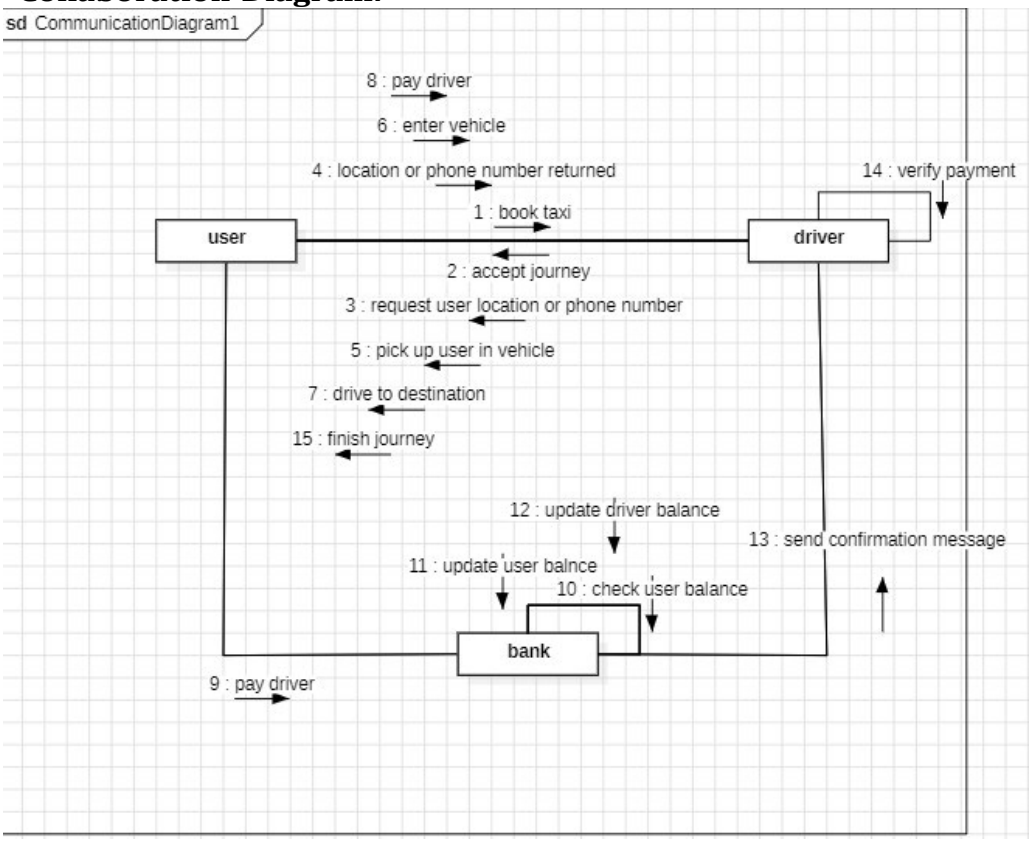
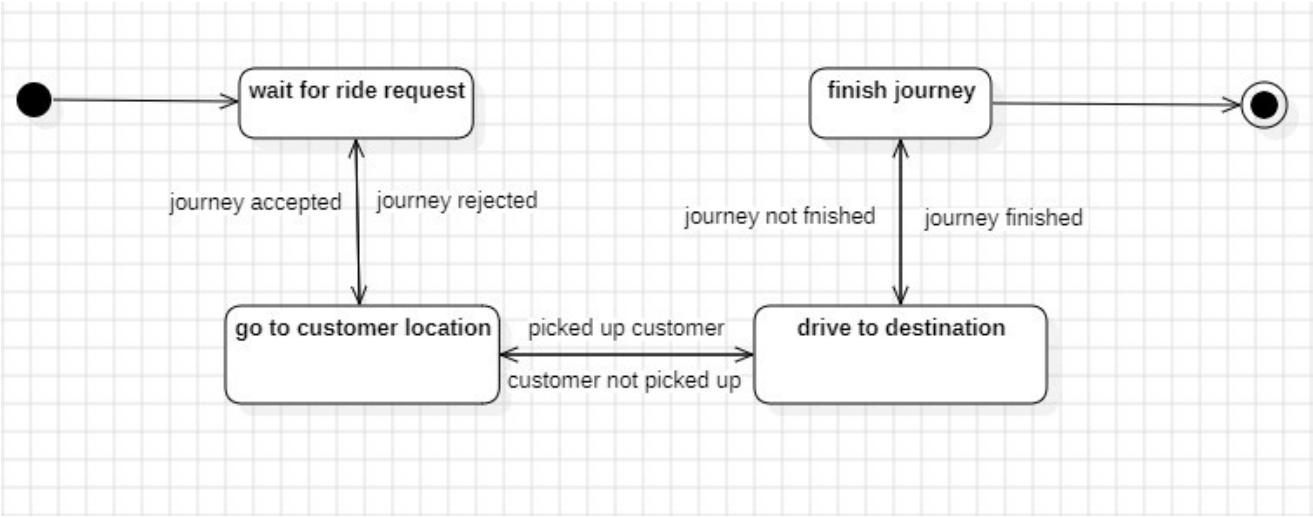
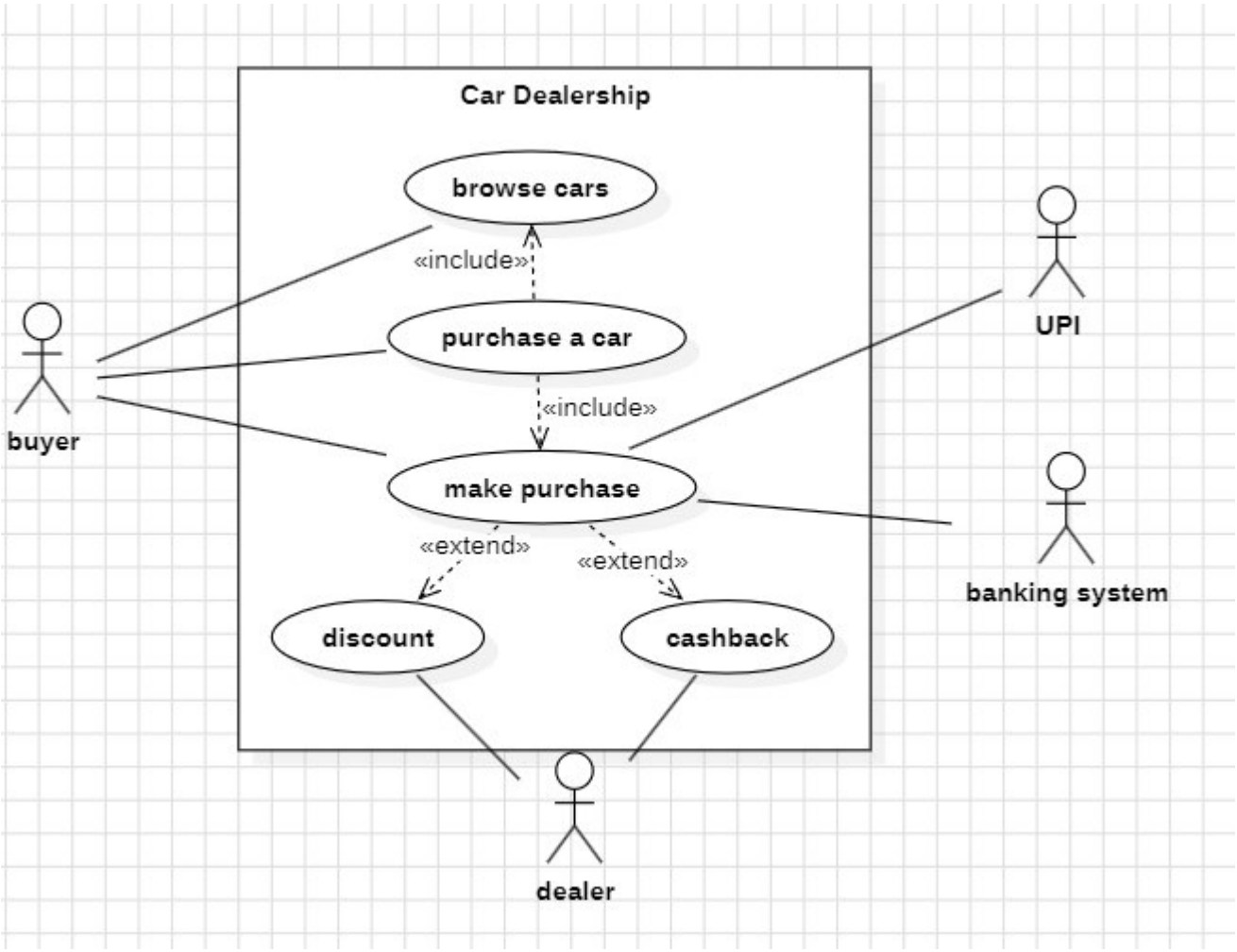


1.e) State-Activity Diagram:

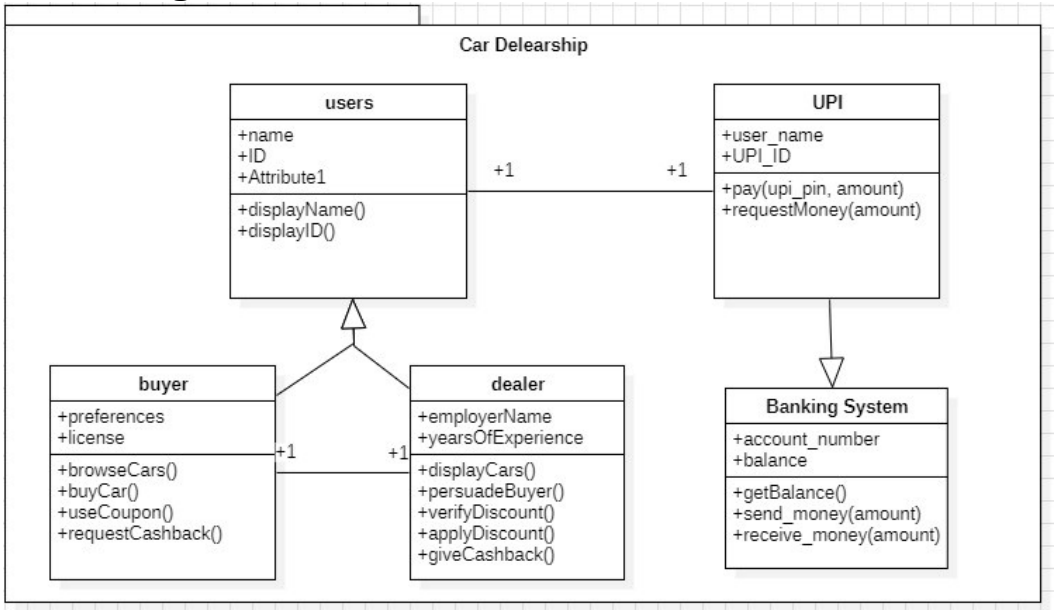


2. CAR DEALERSHIP APPLICATION

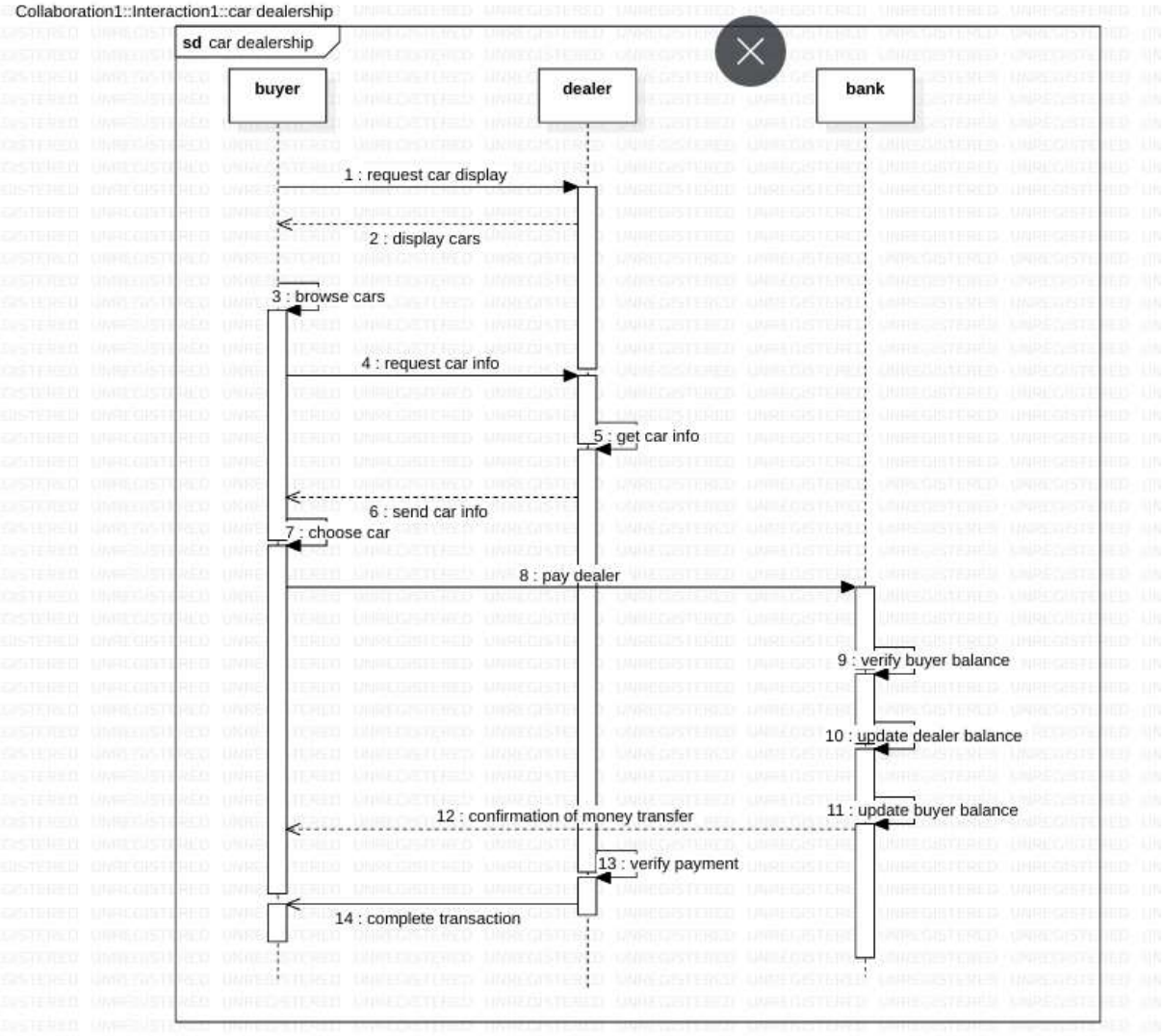
2.a) Use Case Diagram:



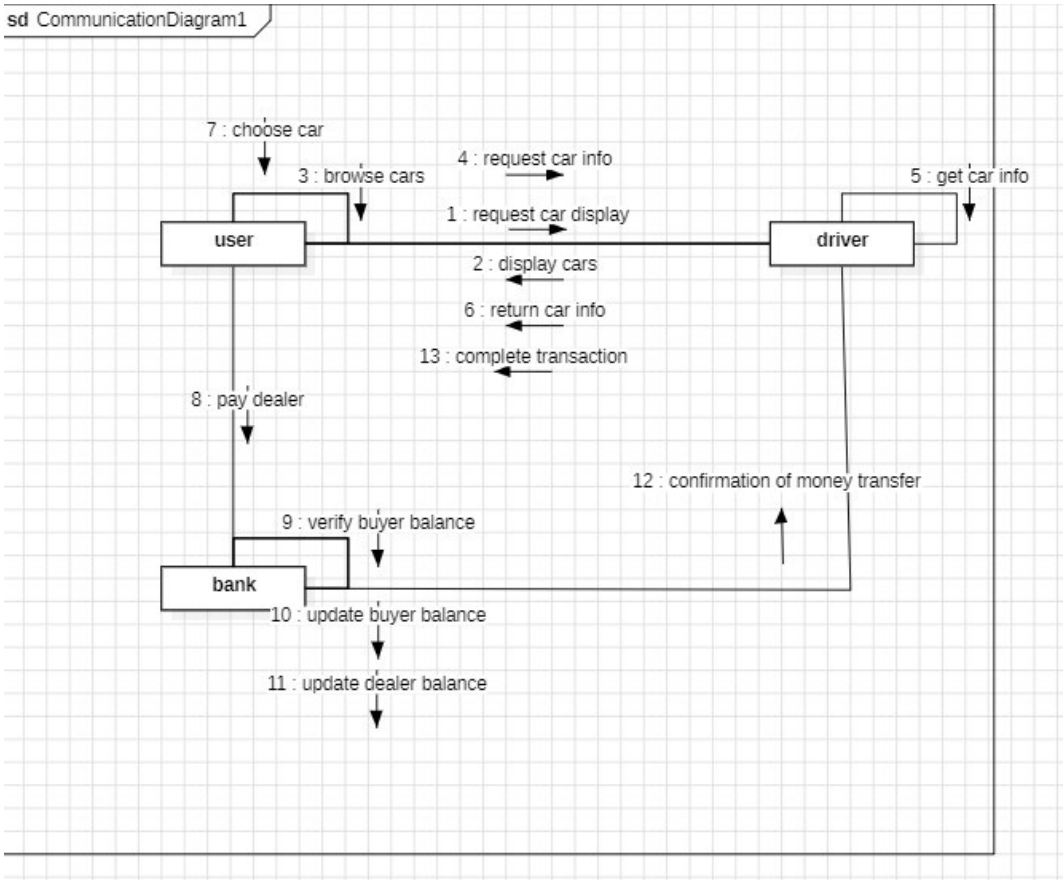
2.b) Class Diagram:



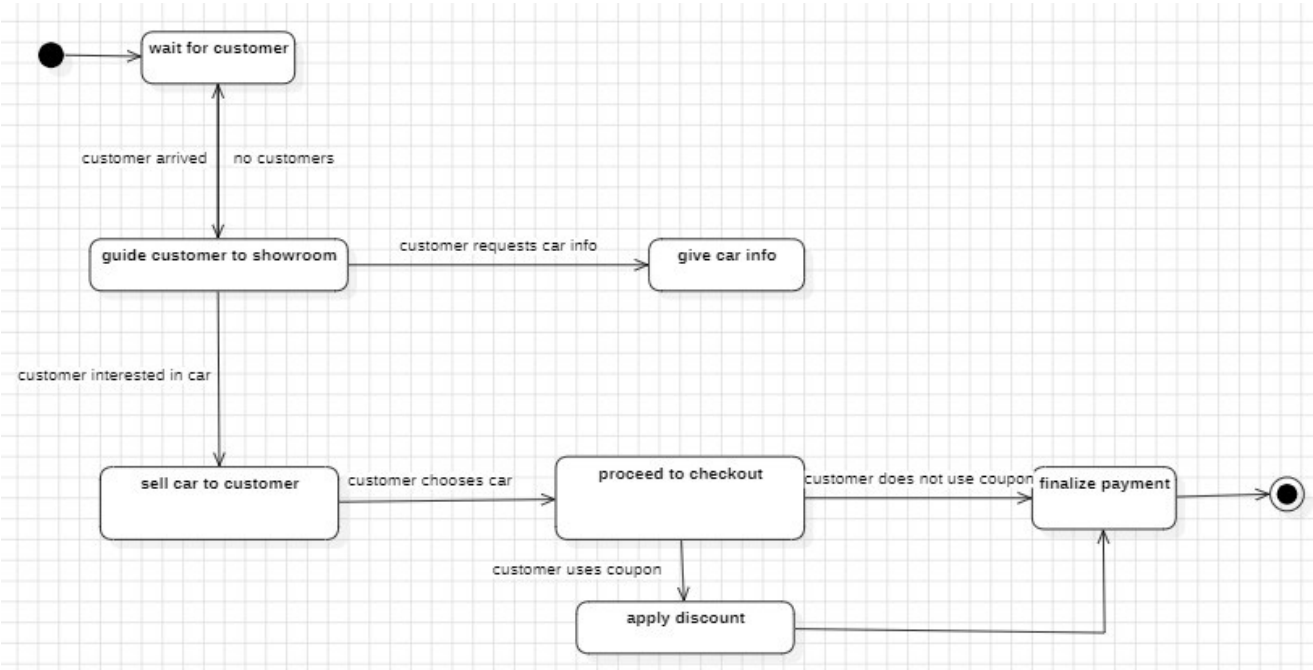
2.c) Sequence Diagram:



2.d) Collaboration Diagram:



2.e) State-Activity Diagram:



3. Basic Java Programs

3.a) CalculateArea of Rectangle, Circle, Triangle:

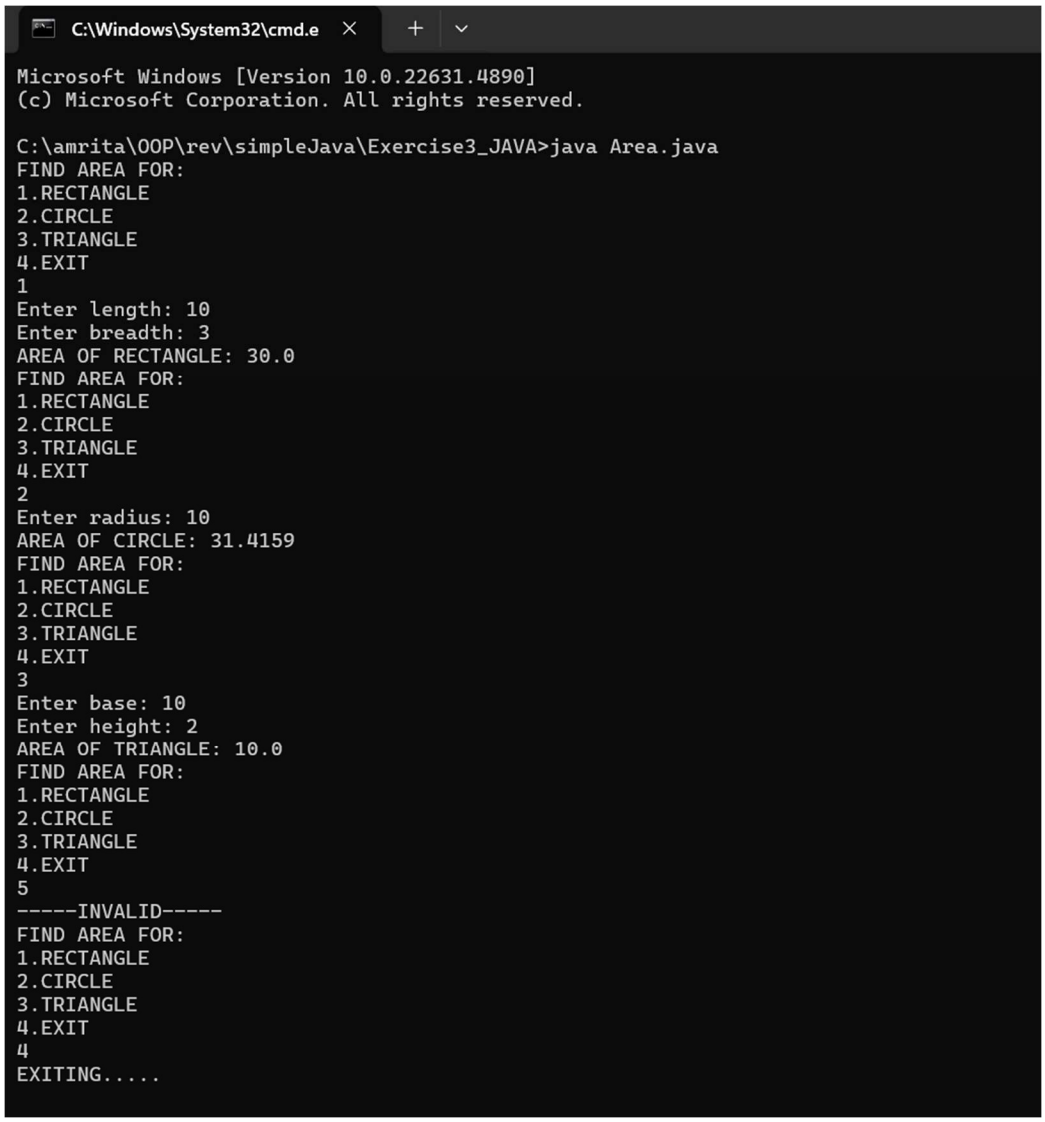
Code:

```
import java.util.Scanner;


class Area{
    public static void main(String[] args){
        int choice=0;
        double l;
        double b;
        double h;
        double r;
        findArea find=new findArea();
        Scanner scan=new Scanner(System.in);
        while(choice!=4){
            System.out.println("FIND AREA FOR:");
            System.out.println("1.RECTANGLE");
            System.out.println("2.CIRCLE");
            System.out.println("3.TRIANGLE");
            System.out.println("4.EXIT");
            choice=scan.nextInt();
            switch (choice) {
                case 1:
                    System.out.print("Enter length: ");
                    l=scan.nextDouble();
                    System.out.print("Enter breadth: ");
                    b=scan.nextDouble();
                    find.rectArea(l, b);
```

```
                    break;
                case 2:
                    System.out.print("Enter radius: ");
                    r=scan.nextDouble();
                    find.CircleArea(r);
                    break;
                case 3:
                    System.out.print("Enter base: ");
                    b=scan.nextDouble();
                    System.out.print("Enter height: ");
                    h=scan.nextDouble();
                    find.triArea(b, h);
                    break;
                case 4:
                    System.out.println("EXITING.....");
                    break;
                default:
                    System.out.println("-----INVALID-----");
            }

        }

    }

}

class findArea{
    public void rectArea(double l, double b){
        double c=l*b;
        System.out.println("AREA OF RECTANGLE: "+c );
```

```
    }
    public void CircleArea(double r){
        double c=3.14159*r;
        System.out.println("AREA OF CIRCLE: "+c );
    }
    public void triArea(double b, double h){
        double c=0.5*b*h;
        System.out.println("AREA OF TRIANGLE: "+c );
    }

}
```

Output:



3.b) Basic Math Operations:

Code:

```
import java.util.Scanner;
class calculate{
    public static void main(String[] args){
        int choice=0;
        Calc calc=new Calc();
        Scanner scan=new Scanner(System.in);
        System.out.print("Enter num1: ");
        int num1=scan.nextInt();
        System.out.print("Enter num2: ");
        int num2=scan.nextInt();
        while(choice!=5){
            System.out.println("PICK AN OPERATION:");
            System.out.println("1.Addition");
            System.out.println("2.Subtraction");
            System.out.println("3.Multiplication");
            System.out.println("4.Division");
            System.out.println("5.EXIT");
            choice=scan.nextInt();
            switch (choice) {
                case 1:
                    calc.add(num1, num2);
                    break;
                case 2:
                    calc.subtract(num1, num2);
                    break;
                case 3:
                    calc.multiply(num1, num2);
```

```
                    break;
                case 4:
                    calc.divide(num1, num2);
                    break;
                case 5:
                    System.out.println("EXITING.....");
                    break;
                default:
                    System.out.println("-----INVALID-----");
            }

        }

    }

}

class Calc{
    public void add(int a, int b){
        int c=a+b;
        System.out.println("ANSWER: "+a + "+"+b+"="+c+"\n");
    }
    public void subtract(int a, int b){
        int c=a-b;
        System.out.println("\nANSWER: "+a + "-" +b + "=" + c+"\n");
    }
    public void multiply(int a , int b){
        int c=a*b;
        System.out.println("\nANSWER: "+a+"x"+b+"="+c+"\n");
    }
    public void divide(double a, double b){
```

```
            double c=a/b;

            System.out.println("\nANSWER: "+a+"/"+b+"="+c+"\n");

        }

    }
```

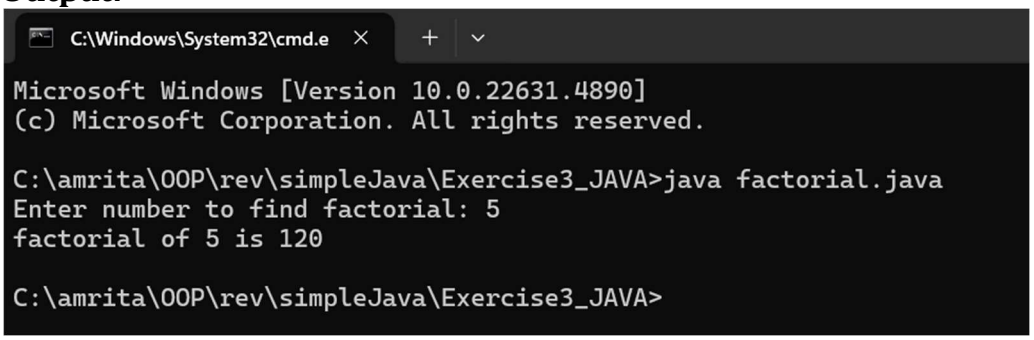
Output:

3.c) Factorial:

Code:

```
import java.util.Scanner;

class factorial{

    public static void main(String[] args){

        Scanner scan=new Scanner(System.in);

        calculate obj=new calculate();

        System.out.print("Enter number to find factorial: ");

        long num=scan.nextLong();

        long fact=obj.fac(num);

        System.out.println("factorial of "+num+" is "+fact);









    }

}

class calculate{

    public long fac(long num){

        long fac=1;

        for(long i=1; i<=num;i++){

                fac=fac*i;

            }

        return fac;

    }

}
```

Output:

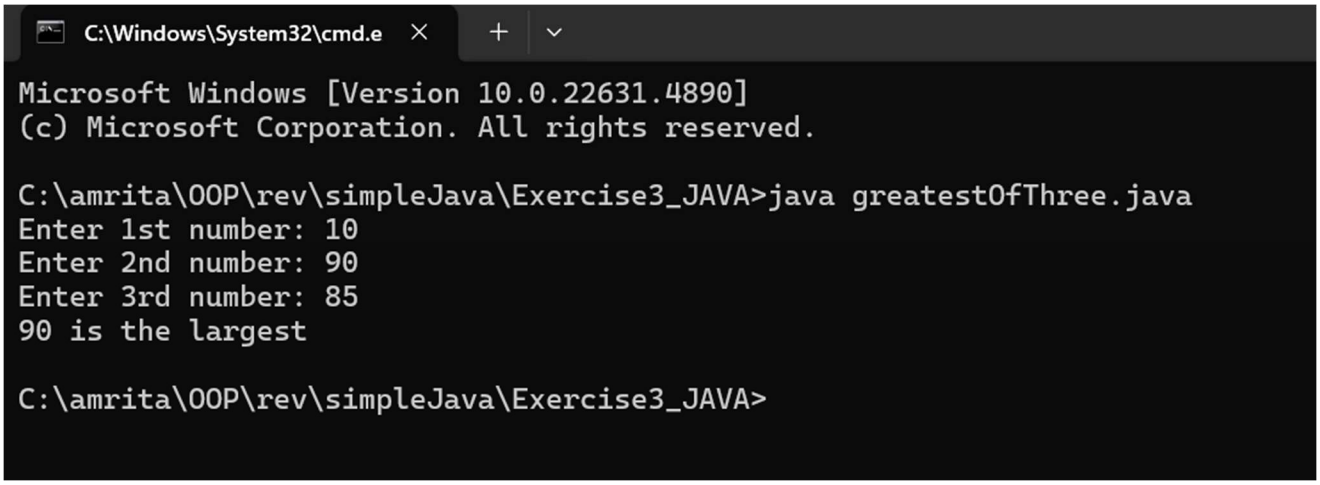


3.d) Finding the Greatest of Three Numbers:

Code:

```
import java.util.Scanner;
class greatestOfThree{
    public static void main(String[] args){
        Scanner scan=new Scanner(System.in);
        System.out.print("Enter 1st number: ");
        int a=scan.nextInt();
        System.out.print("Enter 2nd number: ");
        int b=scan.nextInt();
        System.out.print("Enter 3rd number: ");
        int c=scan.nextInt();
     if (a>b){
            if(a>c){
                System.out.println(a+" is the largest");
            }
        }
        if (b>c){
            if (b>a){
                System.out.println(b+" is the largest");
            }
        }
        if (c>a){
            if(c>b){
                System.out.println(c+" is the largest");
            }
        }
    }
}
```

Output;


C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4890]
(c) Microsoft Corporation. All rights reserved.
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java greatestOfThree.java
Enter 1st number: 10
Enter 2nd number: 90
Enter 3rd number: 85
90 is the largest
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>

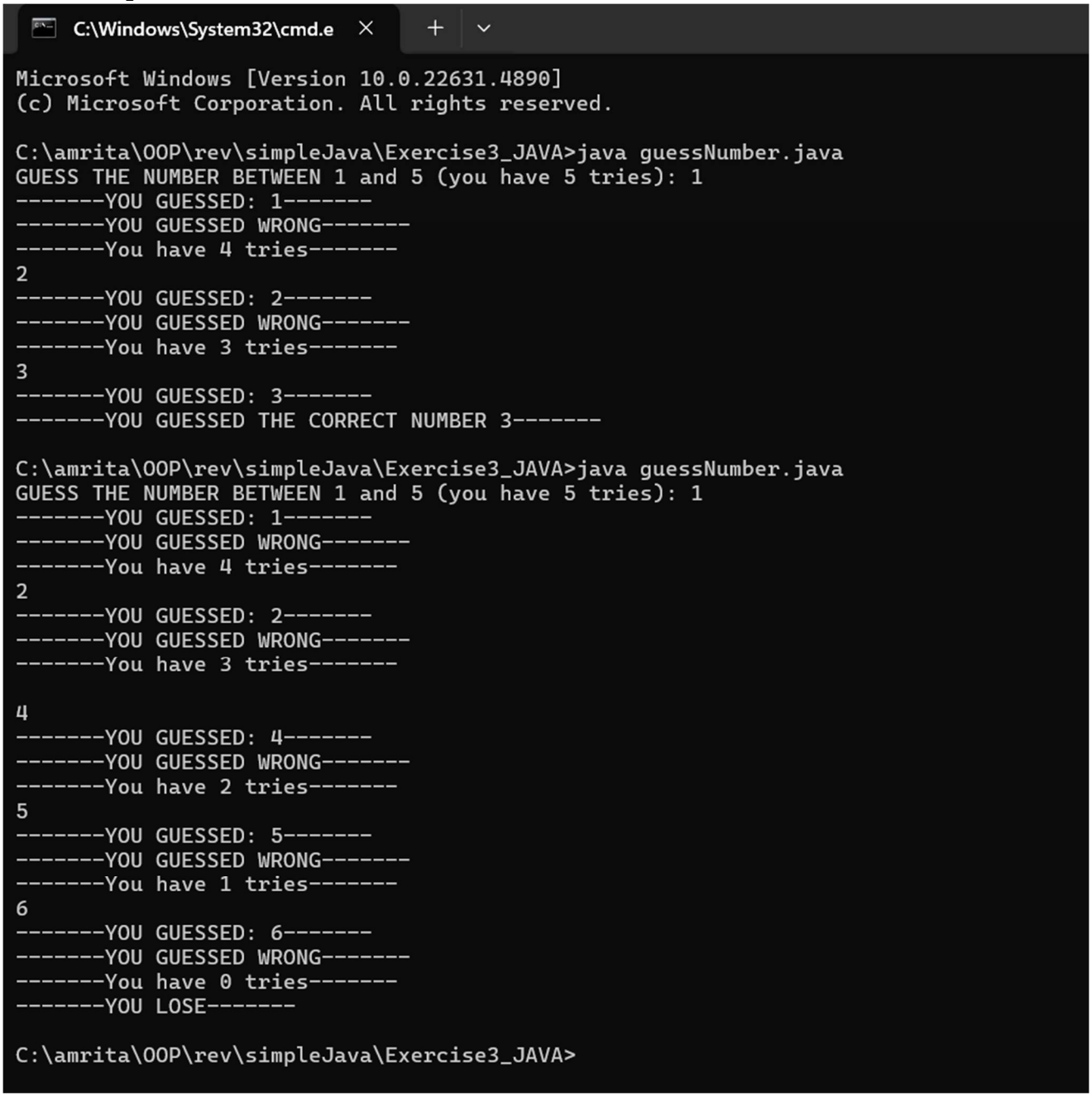
3.e) Number Guessing Game:

Code:

```
import java.util.Scanner;
class guessNumber{
    public static void main(String[] args){
        int choice=0;
        int tries=5;
        Scanner scan=new Scanner(System.in);
        System.out.print("GUESS THE NUMBER BETWEEN 1 and 5 (you have 5
tries): ");
        while(tries>0){
            choice=scan.nextInt();
            System.out.println("-------YOU GUESSED: "+choice+"-------");
            if (choice==3){
                System.out.println("-------YOU GUESSED THE CORRECT NUMBER
3-------");
                break;
            }
            else{
                System.out.println("-------YOU GUESSED WRONG-------");
                tries=tries-1;
                System.out.println("-------You have "+tries+" tries-------
");
            }
            if (tries==0){
                System.out.println("-------YOU LOSE-------");
                break;
            }
        }
    }
```

```
}
```

Output:

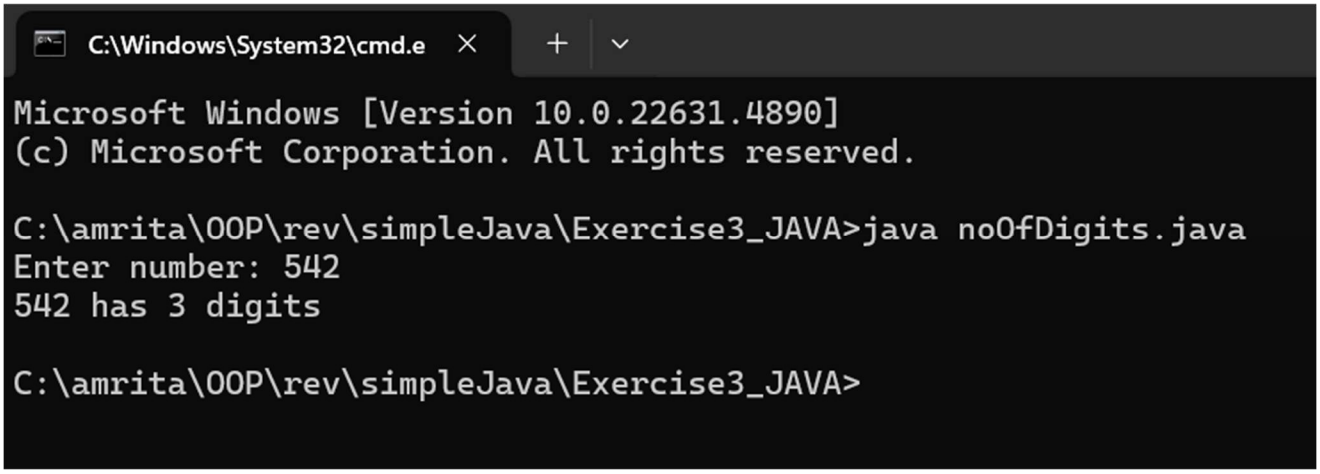

C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4890]
(c) Microsoft Corporation. All rights reserved.
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java guessNumber.java
GUESS THE NUMBER BETWEEN 1 and 5 (you have 5 tries): 1
-------YOU GUESSED: 1-------
-------YOU GUESSED WRONG-------
-------You have 4 tries-------
2
-------YOU GUESSED: 2-------
-------YOU GUESSED WRONG-------
-------You have 3 tries-------
3
-------YOU GUESSED: 3-------
-------YOU GUESSED THE CORRECT NUMBER 3-------
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java guessNumber.java
GUESS THE NUMBER BETWEEN 1 and 5 (you have 5 tries): 1
-------YOU GUESSED: 1-------
-------YOU GUESSED WRONG-------
-------You have 4 tries-------
2
-------YOU GUESSED: 2-------
-------YOU GUESSED WRONG-------
-------You have 3 tries-------
4
-------YOU GUESSED: 4-------
-------YOU GUESSED WRONG-------
-------You have 2 tries-------
5
-------YOU GUESSED: 5-------
-------YOU GUESSED WRONG-------
-------You have 1 tries-------
6
-------YOU GUESSED: 6-------
-------YOU GUESSED WRONG-------
-------You have 0 tries-------
-------YOU LOSE-------
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>

3.f) Find Number of Digits in a Number:

Code:

```
public class NumberPattern {
    import java.util.Scanner;

    class noOfDigits{

        public static void main(String[]
        args){

            Scanner scan=new
        Scanner(System.in);

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

            int num=scan.nextInt();

            int tnum=num;

            int digits=0;

            while (tnum>0){

                int digit=tnum%10;

                tnum=tnum/10;

                digits+=1;

            }

            System.out.println(num+" has
        "+digits+" digits");

        }

    }
```

Output:


C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4890]
(c) Microsoft Corporation. All rights reserved.
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java noOfDigits.java
Enter number: 542
542 has 3 digits
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>

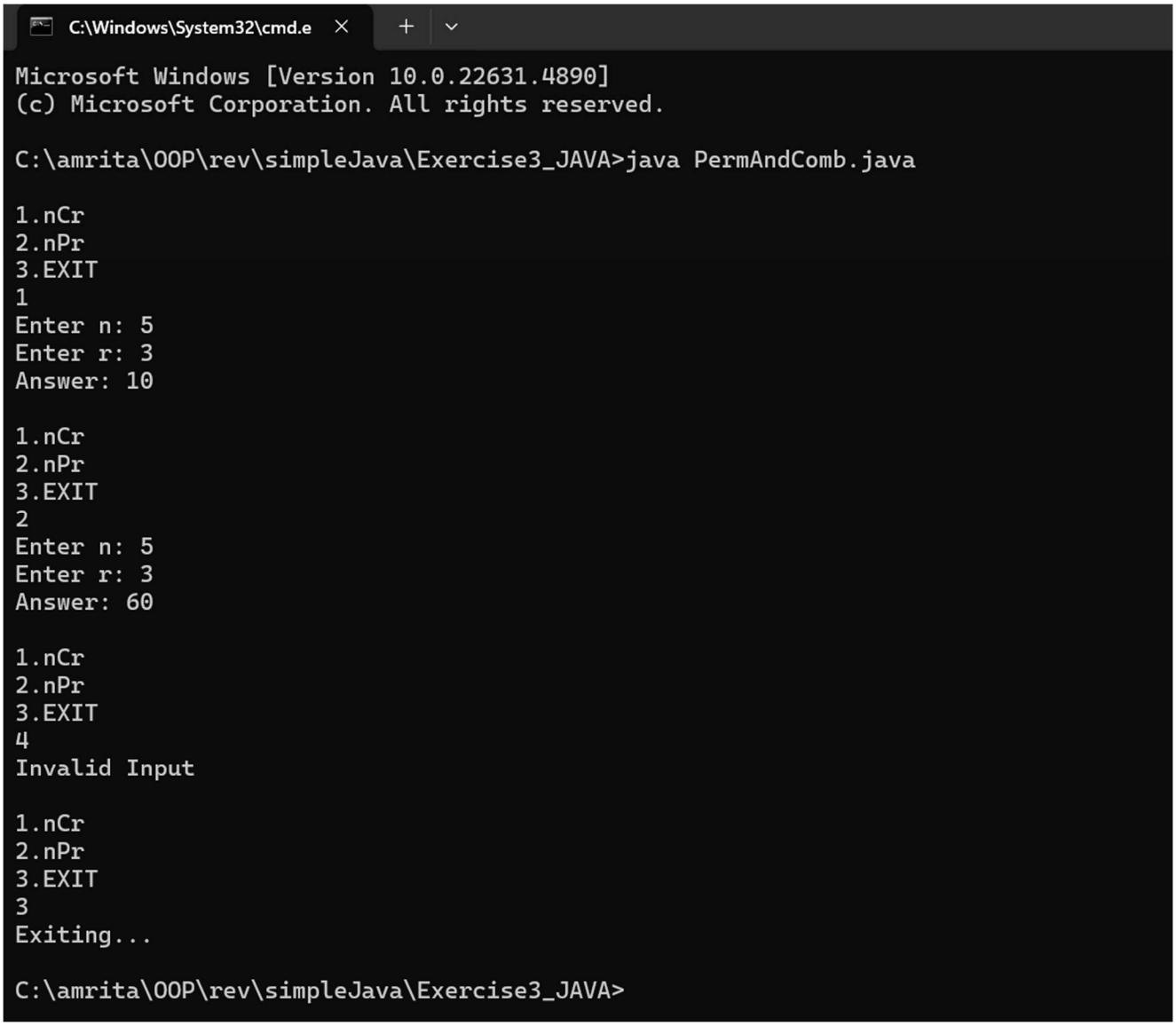
3.g) Permutaions and Combinations:

Code:

```
import java.util.Scanner;
class PermAndComb{
    public static void main(String[] args){
        int ch=0;
        while(ch!=3){
            Operations obj=new Operations();
            Scanner scan=new Scanner(System.in);
            System.out.println("\n1.nCr");
            System.out.println("2.nPr");
            System.out.println("3.EXIT");
            ch=scan.nextInt();
            if(ch==1){
                System.out.print("Enter n: ");
                int n=scan.nextInt();
                System.out.print("Enter r: ");
                int r=scan.nextInt();
                System.out.println("Answer: "+obj.C(n,r));
            }
            else if(ch==2){
                System.out.print("Enter n: ");
                int n=scan.nextInt();
                System.out.print("Enter r: ");
                int r=scan.nextInt();
                System.out.println("Answer: "+obj.P(n,r));
            }
            else if(ch==3){
                System.out.println("Exiting...");
```

```
                    break;
                }
                else{
                    System.out.println("Invalid Input");
                }
            }
        }
    }

    class factorial{
        public long factorial(long n){
            long fac=1;
            for(int i=2;i<=n;i++){
                fac=fac*i;
            }
            return fac;
        }
    }

    class Operations extends factorial{
        public long P(int n, int r){
            return factorial(n)/factorial(n-r);
        }
        public long C(int n, int r){
            return factorial(n)/((factorial(n-r))*factorial(r));
        }
    }
```

Output:

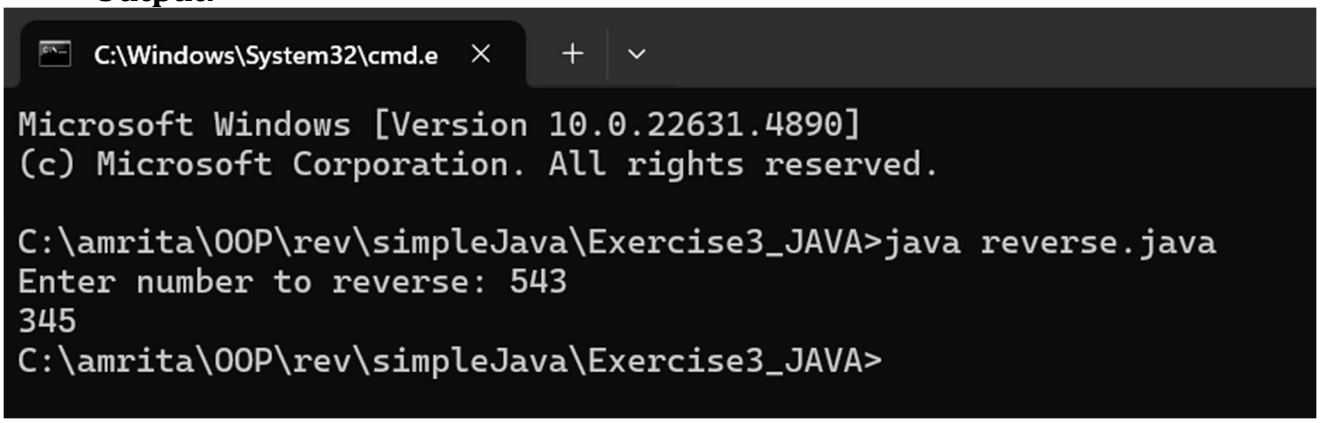

C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4890]
(c) Microsoft Corporation. All rights reserved.
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java PermAndComb.java
1.nCr
2.nPr
3.EXIT
1
Enter n: 5
Enter r: 3
Answer: 10
1.nCr
2.nPr
3.EXIT
2
Enter n: 5
Enter r: 3
Answer: 60
1.nCr
2.nPr
3.EXIT
4
Invalid Input
1.nCr
2.nPr
3.EXIT
3
Exiting...
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>

3.h) Reversing an Integer:

Code:

```
import java.util.Scanner;
class reverse{
    public static void main(String[] args){
        Scanner scan=new Scanner(System.in);
        System.out.print("Enter number to reverse: ");
        int num=scan.nextInt();
        int rev=0;
        int digit=0;
        while(num>0){
            digit=num%10;
            rev=rev*10+digit;
            num=num/10;
            }
        System.out.print(rev);
    }
}
```

Output:

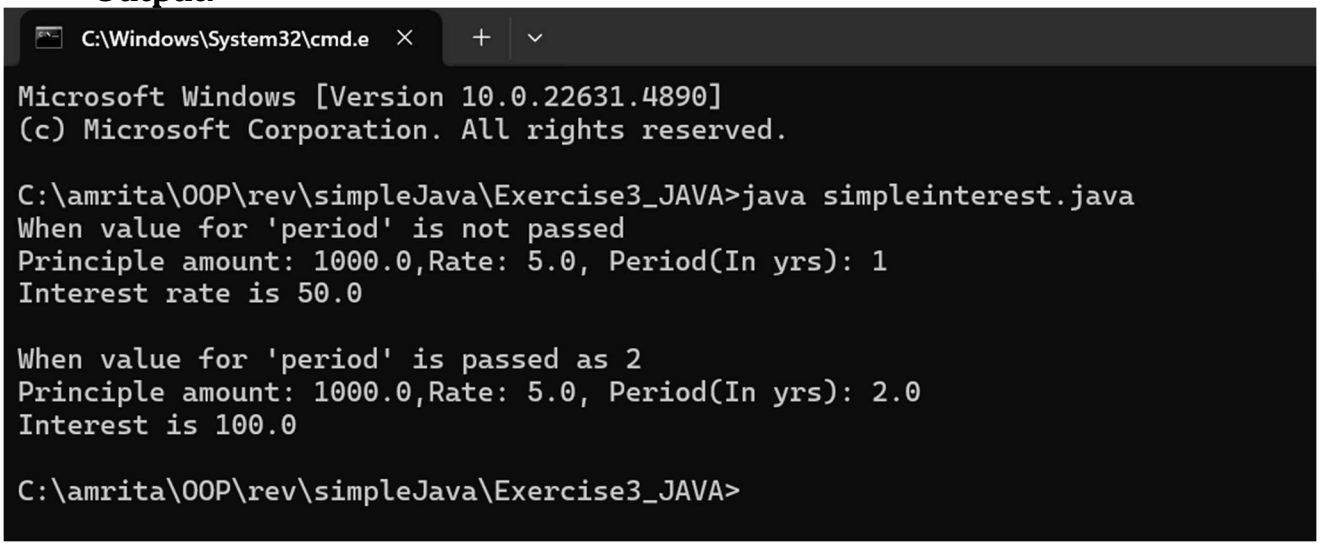


3.i) Calculate Simple Interest:

Code:

```
class simpleInterest{
    public static void main(String[] args){
    Calc obj=new Calc();
    System.out.println("When value for 'period' is not passed");
    obj.s_interest(1000,5);
    System.out.println("\nWhen value for 'period' is passed as 2");
    obj.s_interest(1000,5,2);

    }
}

class Calc{
    public static void s_interest(double principle, double rate, double
period){
        double interest=principle*(rate/100.0)*period;
        System.out.println("Principle amount: " + principle +",Rate: "+
rate +", Period(In yrs): " + period );
        System.out.println("Interest is " + interest);
    }
    public static void s_interest(double principle, double rate){
        double interest=principle*(rate/100.00)*1.00;
        System.out.println("Principle amount: "+principle+",Rate: "+rate+",
Period(In yrs): "+ 1 );
        System.out.println("Interest rate is "+interest);
    }

}
```

Output:


C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4890]
(c) Microsoft Corporation. All rights reserved.
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>java simpleinterest.java
When value for 'period' is not passed
Principle amount: 1000.0,Rate: 5.0, Period(In yrs): 1
Interest rate is 50.0
When value for 'period' is passed as 2
Principle amount: 1000.0,Rate: 5.0, Period(In yrs): 2.0
Interest is 100.0
C:\amrita\OOP\rev\simpleJava\Exercise3_JAVA>

3.j) Sum of Squares of First n Natural Numbers:

Code:

```
import java.util.Scanner;

class sqaureSum{

    public static void main(String[] args){

        Scanner scan=new Scanner(System.in);

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

        int n=scan.nextInt();

        int sum=0;

        for(int count=0;count<=n;count++){

            sum+=count*count;}

        System.out.println("sum of the squares of the first "+n+" natural
numbers is "+sum);

    }

}
```

Output: