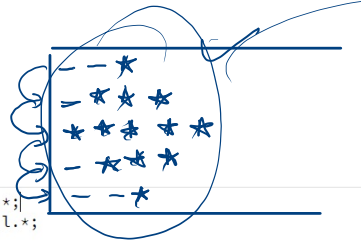
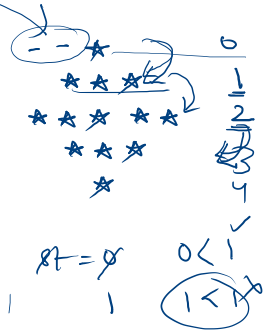
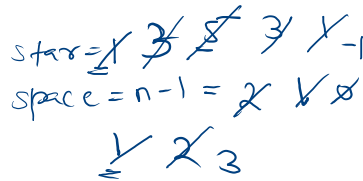
Diamond







```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int star = 1;
        int space = n-1;

        for(int row = 0; row < (2*n-1) ; row++){    //work for 2n-1 times
            for(int sp = 0; sp < space; sp++){
                System.out.print(" ");
            }
            for(int st = 0; st < star; st++){
                 System.out.print("*");
            }
            System.out.println();
            //update

            if(row < n-1){
                star += 2;
                space--;
            }else{
                star -= 2;
                space++;
            }

        }
    }
}
```

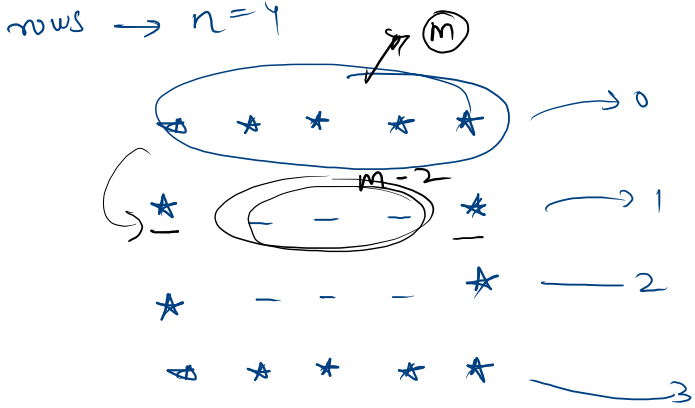
Pattern 7 - Print a hollow m by n star rectangle.

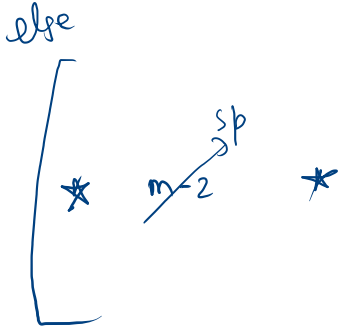
Sample Input 0

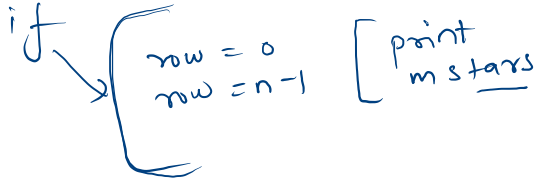
```
5
4
```

Sample Output 0

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

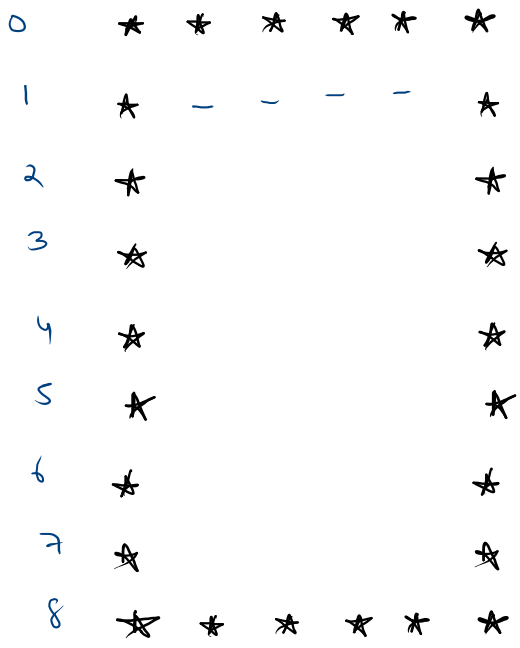






m = 6

n = 9



row = 0 or = n-1 } m stars.

else * m-2 *

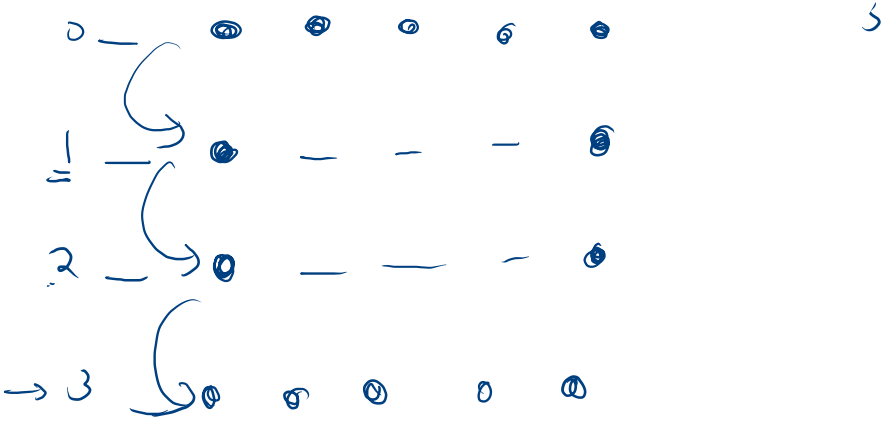
Sample Input 2

```
6
9
```

Sample Output 2

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

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int m = scn.nextInt();
        int n = scn.nextInt();

        for(int row = 0; row < n; row++){
            if(row == 0 || row == n-1){
                //print m stars
                for(int st = 0; st < m; st++){
                    System.out.print("*");
                }
            }else{
                //* m-2 sp *
                System.out.print("*");
                for(int sp = 0; sp < m-2; sp++){
                    System.out.print(" ");
                }
                System.out.print("*");
            }

            System.out.println();
        }
    }
}
```



Pattern 8 - Print a hollow square without top

Sample Input 0

```
5
```

Sample Output 0

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

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);

        int n = scn.nextInt();

        for(int row = 0; row < n; row++){
            if(row == n-1){
                //print n stars
                for(int st = 0; st < n; st++){
                    System.out.print("*");
                }
            }else{
                //* n-2 sp *
                System.out.print("*");
                for(int sp = 0; sp < n-2; sp++){
                    System.out.print(" ");
                }
                System.out.print("*");
            }

            System.out.println();
        }
    }
}
```

Pattern 9 - Square Ladder with top and bottom

Take **n** as an integer input, then

print **n** tab separated stars in the first line,

then in the second line print a star, then **n-2** tabs, then print a star.

then print **n** tab separated stars in the third line.

then in the **fourth** line print a star, then **n-2** tabs, then print a star .

Example: n=5

Pattern will be:

row → even → n star

odd → ★ n-2 ★

$\{ n = 5$

\t

0 ★ ——— ★ — ★ — ★ — ★

1 ★ ★

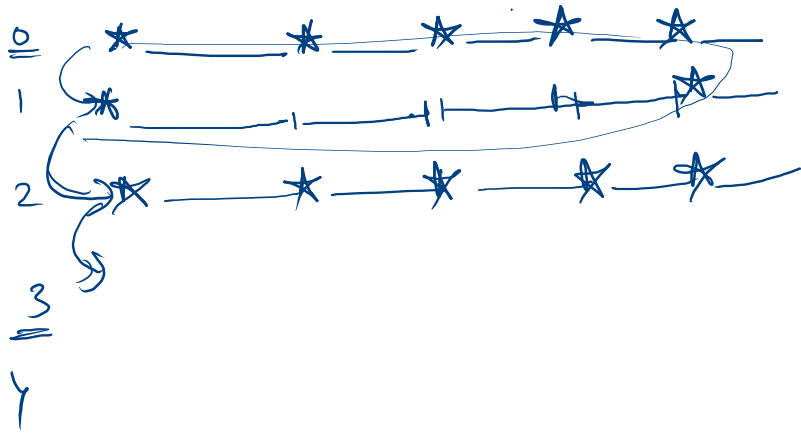
2 ★ — ★ — ★ ★ — ★

3 ★ ★

4 ★ ——— ★ — ★ — ★ — ★

n = 5

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        for(int row = 0; row < n; row++){
            if(row % 2 == 0){   // n star
                for(int i = 0; i < n; i++){
                    System.out.print("*\t");
                }
            }else{
                System.out.print("*\t");
                for(int i = 0; i < n-2; i++){
                    System.out.print("\t");
                }
                System.out.print("*\t");
            }
            System.out.println();
        }
    }
}
```



function.

$$f(x) = x^2$$

maths

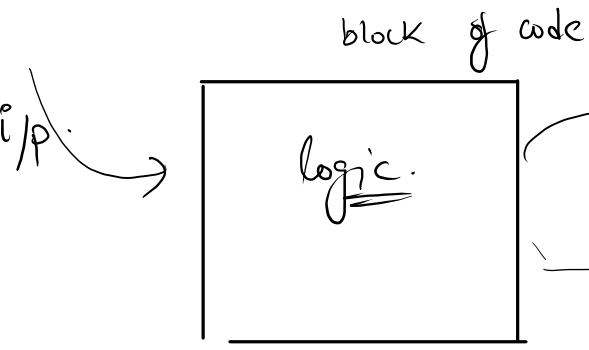
$$f(3) = 9$$

$$f(x, y) = 2x + y.$$

$x = 5$
$y = 3$

$$= 13$$

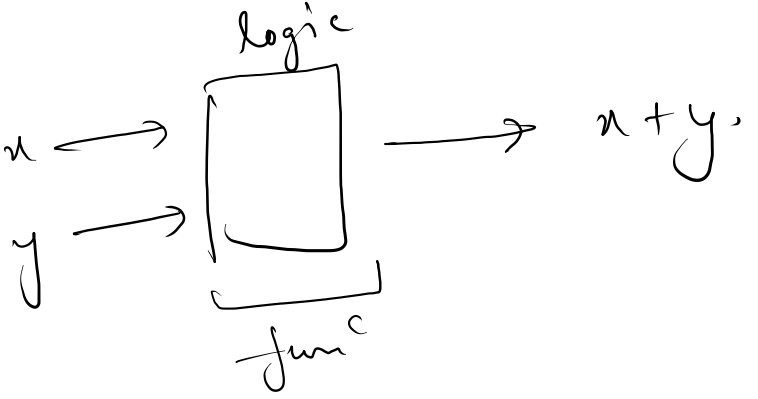
function

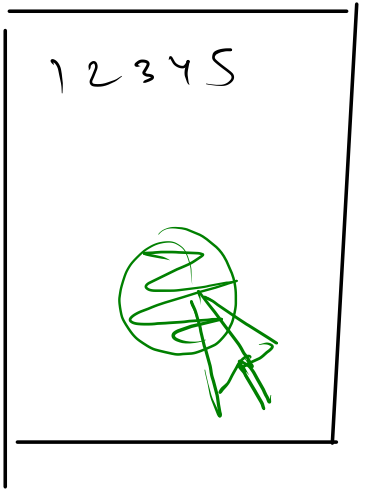


small part of program

particular task.

function.





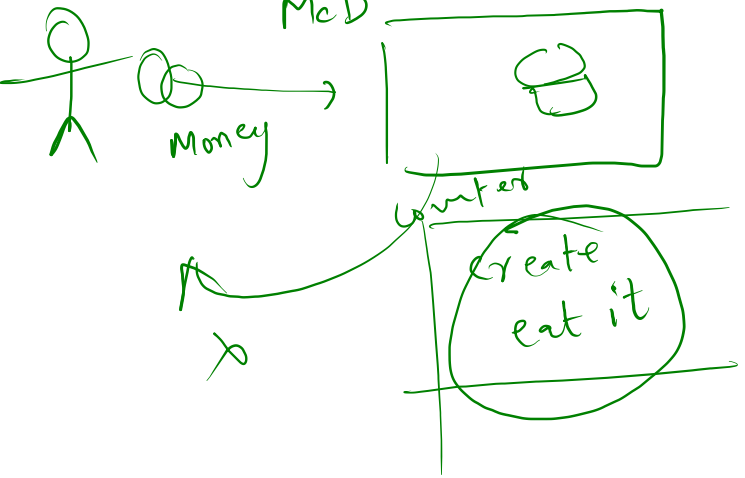
$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720.$

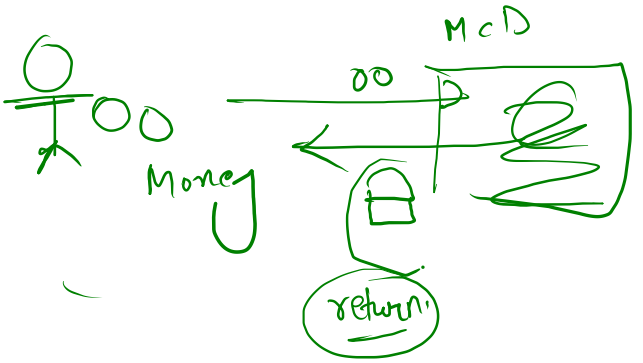
Code 5!

```java

public class Main
{
    public static void main(String[] args) {
        int val = 3;
        int ans = 1;
        for(int i = 1; i <= val; i++){
            ans = ans * i;
        }
        System.out.println(ans);
    }
}

```

void



anything else.



no i/p / void.

```java
import java.util.*;
public class Main
{

    public static void mySelf(){
        System.out.println("Aman");
        System.out.println("52");
        System.out.println("Delhi");
        System.out.println("Pizza");
    }


    public static void main(String [] args){
        mySelf();


    }
```

parameter / void.

```java
import java.util.*;
public class Main
{

    public static void wishMe(String name){
        System.out.println("Hi " + name + " I am eating ur burger");
    }


    public static void main(String [] args){
        Scanner scn = new Scanner(System.in);
        String s = "Shubham";
        wishMe(s);
        wishMe("Nikhil");


    }
}
```

no para / int

```java
public class Main
{

    public static int priceOfPen(){
        return 15;
    }

    public static void main(String[] args) {
        int price = priceOfPen();       //price = 10;




        System.out.println("Price in India: " + price);
        System.out.println("Price in USA: " + (price + 2));
        System.out.println("Price in China: " + (price-3));
    }
}

```

para / int

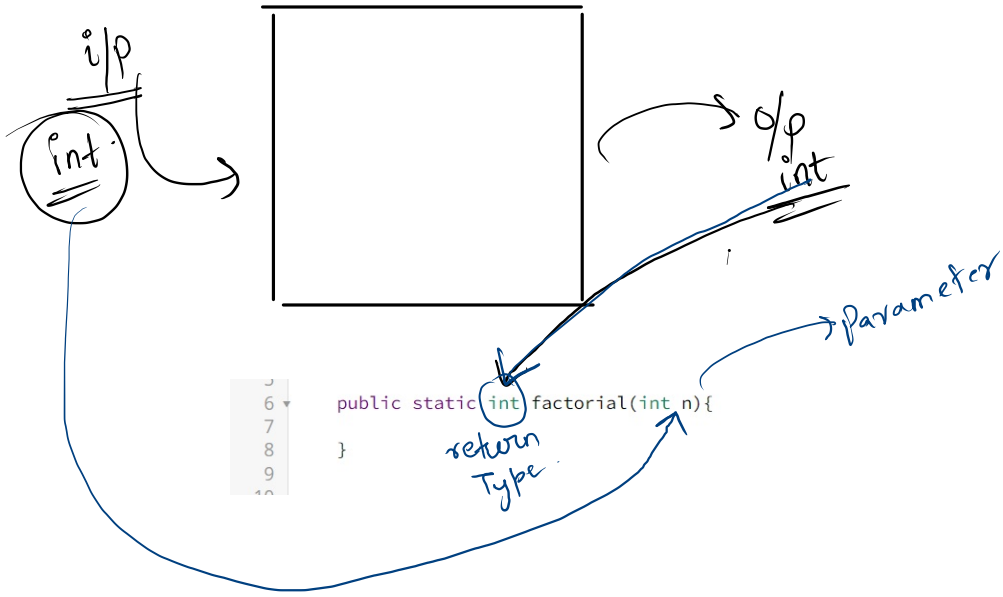
```java

    public static int powerOf2(int n){
        int ans = 1;
        for(int i = 0; i < n; i++){
            ans *= 2;
        }
        return ans;
    }


    public static void main(String[] args) {
        System.out.println(powerOf2(3));
        System.out.println(powerOf2(5));

    }

}

```

factorial

i/p { N

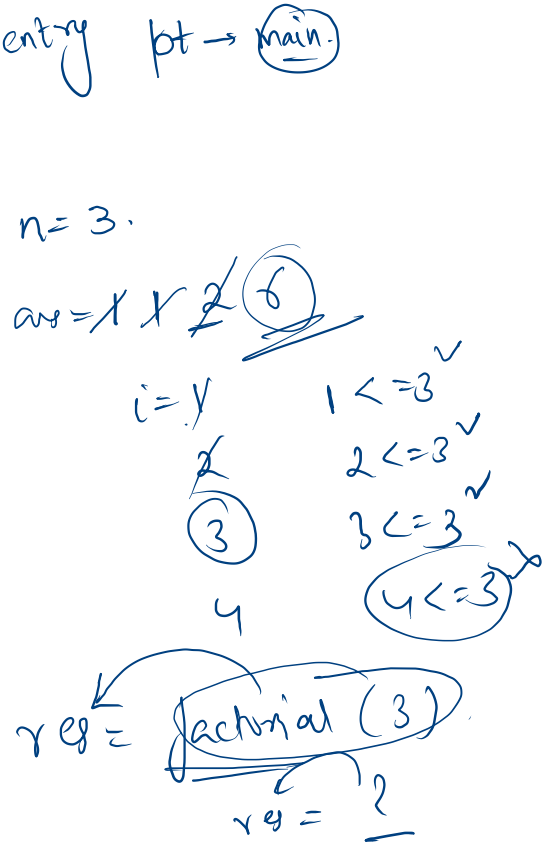
eg. N=3 → 6
=5 → 120

int



```java
import java.io.*;
import java.util.*;

public class Solution {

    public static int factorial(int n){
        int ans = 1;
        for(int i = 1; i <= n; i++){
            ans *= i;
        }
        return ans;
    }


    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();

        int res = factorial(n);
        System.out.println(res);
    }
}
```

res = 6



```java
import java.io.*;
import java.util.*;

public class Solution {

    public static long factorial(int n){
        long ans = 1;
        for(int i = 1; i <= n; i++){
            ans *= i;
        }
        return ans;
    }


    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();

        long res = factorial(n);
        System.out.println(res);
    }
}
```

$$\frac{n!}{r!\,(n-r)!} = {}^{n}C_{r}$$

$$\text{area} = s * s$$

Combination.

$$nC_r = \frac{n!}{r!\,(n-r)!}$$

$a = \text{factorial}(n)$

$b = \text{factorial}(r)$

$c = \text{factorial}(n-r)$

$$nC_r = \frac{a}{b \times c}$$

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static int factorial(int x){
        int ans = 1;
        for(int i = 1; i <= x; i++){
            ans *= i;
        }
        return ans;
    }

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int r = scn.nextInt();

        int a = factorial(n);
        int b = factorial(r);
        int c = factorial(n-r);

        int ans = (a) / (b*c);
        System.out.println(ans);

    }
}
```

$${}^{n}C_r = \frac{n!}{r!(n-r)!} = \frac{5!}{3!2!}$$

$$= \frac{5 \times 4 \times 3!}{3! \times 2!}$$

$$= 10$$

$n = 5$

$r = 3$

$a = 120$

$b = 6$

$c = 2$

$\frac{120}{12} = 10$

ans $= a / b \times c$

$= 120 / (6 \times 2)$

Find sum using a function

The process goes like:

You have to first take input of two numbers **x** and **y** as an integer input.

Then make a function **findSum(int x, int y)**, which takes in these two integers as parameters and prints the final **sum**.

Sample Input 0

```
2
10
20
30
40
```

Sample Output 0

```
30
70
```

Input Format

T will be given as input represents the number of test cases.

For each test case,

x will be given as input in the first line,

y will be given as input in the second line.

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static int sum(int x, int y){
        return x + y;
    }

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int t = scn.nextInt();      //2

        for(int i = 0; i < t; i++){     //2 times
            int x = scn.nextInt();      // 4   8
            int y = scn.nextInt();      // 5   2

            int ans = sum(x, y);        // find the sum of (4,5)   find the sum of (8,2)
            System.out.println(ans);    // 9    10
        }
    }
}
```

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static int factorial(int x){
        int ans = 1;
        for(int i = 1; i <= x; i++){
            ans *= i;
        }
        return ans;
    }

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int r = scn.nextInt();

        int a = factorial(n);
        int b = factorial(r);
        int c = factorial(n-r);

        int ans = (a) / (b*c);
        System.out.println(ans);

    }
}
```

Given x and y, print xy

Take **x** and **y** digits as integer inputs and then form a number **xy** from it and then finally print that number.

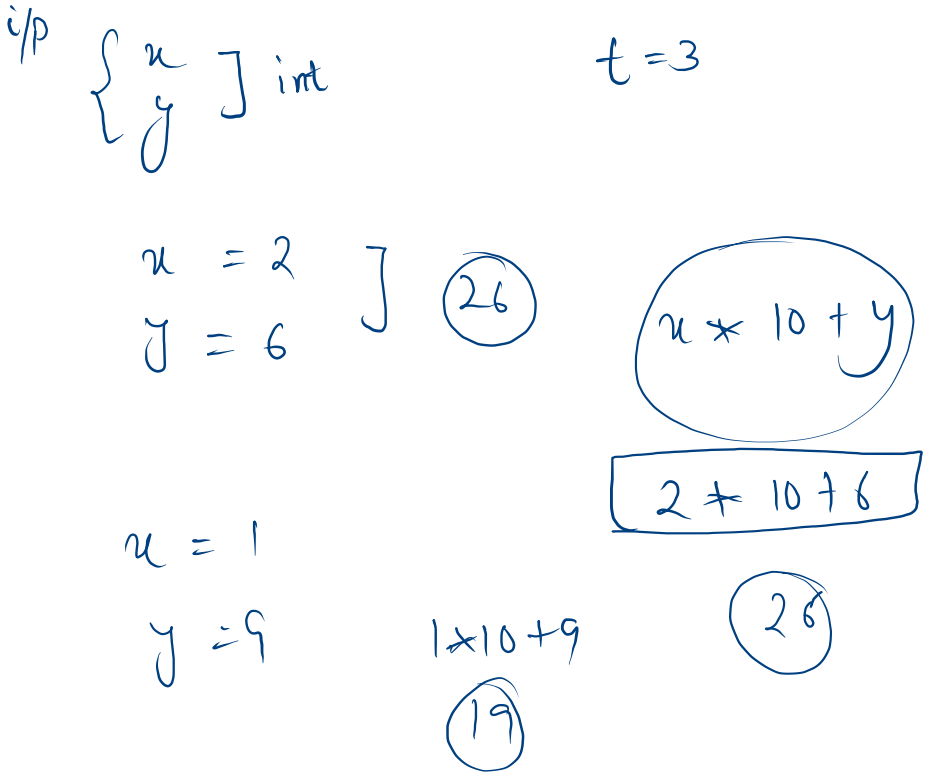
for eg. if you are the given **3** and **4**, then you have to form the number **34** from it and then finally print the number **34**.

Sample Input 1

```
3
8
9
9
9
5
6
```

Sample Output 1

```
89
99
56
```



```java
import java.io.*;
import java.util.*;

public class Solution {

    public static int getNumber(int x, int y){
        return x * 10 + y;
    }


    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int t = scn.nextInt();
        for(int i = 1; i <=t ; i++){
            int x = scn.nextInt();
            int y = scn.nextInt();
            int ans = getNumber(x, y);
            System.out.println(ans);
        }
    }
}
```