Today's agenda

- factorial
- ^nC_r & ^nP_r
- functions

Q) factorial

↳ Given N, Print factorial of N.

Quiz 1: fact(4): 1 * 2 * 3 * 4 = 24

fact(N) = 1 * 2 * 3 ..... * N

```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt(); → 5

    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;
    }

    s.o.p (ans);
}
```

N = 4

ans = ~~XXX~~ 24

```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt(); → 5

    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;    // ans * i
    }

    → s.o.p (ans);
}
```

i	i <= n
1	t
2	t
3	t
4	t
5	f

exit

24

// ^nC_r and ^nP_r

Quiz 2: $^5C_3 \rightarrow \frac{5!}{3!2!} = \frac{120}{12} = 10$ $\quad {}^nC_r = \frac{n!}{r!(n-r)!}$

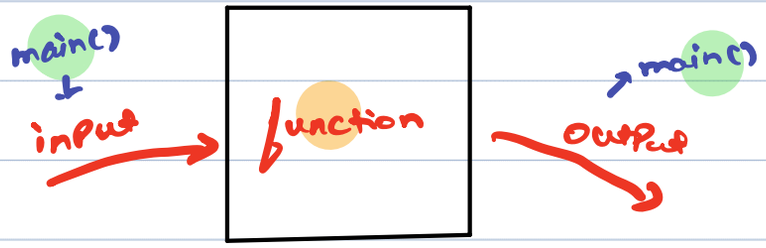
Quiz 3: $^5P_3 \rightarrow \frac{5!}{2!} = \frac{120}{2} = 60$ $\quad {}^nP_r = \frac{n!}{(n-r)!}$

Q) Given n and r, write an algorithm to calculate ^nC_r.

$\frac{n}{r \quad n-r}$

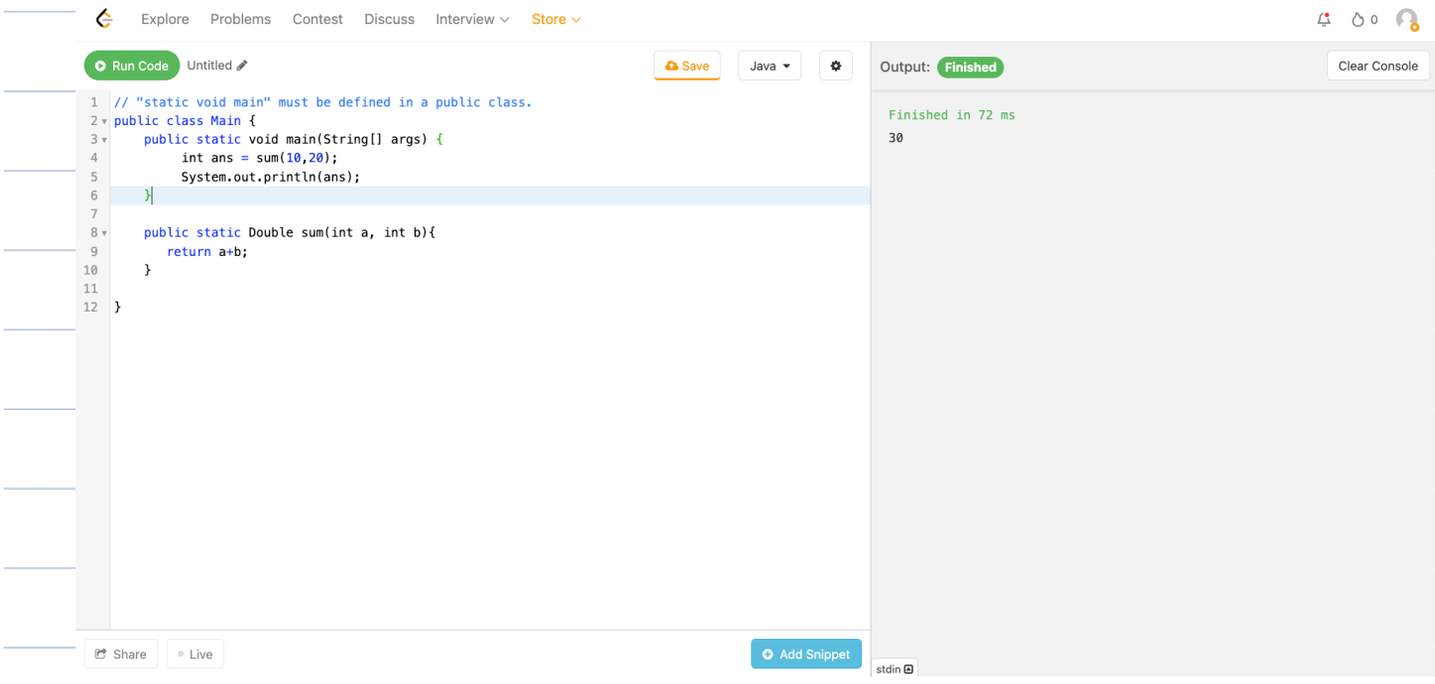
```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt ();
    int r = scn.nextInt ();

    int ans1 = 1;                          → n
    for (int i=1; i<=n; i++) {
        ans1 = ans1 * i;
    }

    int ans2 = 1;                          → r
    for (int i=1; i<=r; i++) {
        ans2 = ans2 * i;
    }

    int ans3 = 1;                          → n-r
    for (int i=1; i<=n-r; i++) {
        ans3 = ans3 * i;
    }

    int ans = ans1 / (ans2 * ans3);
    S.O.P (ans);
}
```

DRY → Do not repeat yourself



Syntax:

```
                    output
                      ↓
public static int name (input) {

    //statement 1
    //statement 2
    //statement 3

}
```


Explore
Problems
Contest
Discuss
Interview
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Run Code
Untitled
Save
Java
Output:
Finished
Clear Console
// "static void main" must be defined in a public class.
public class Main {
public static void main(String[] args) {
int ans = sum(10,20);
System.out.println(ans);
}
public static Double sum(int a, int b){
return a+b;
}
}
Finished in 72 ms
30
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stdin

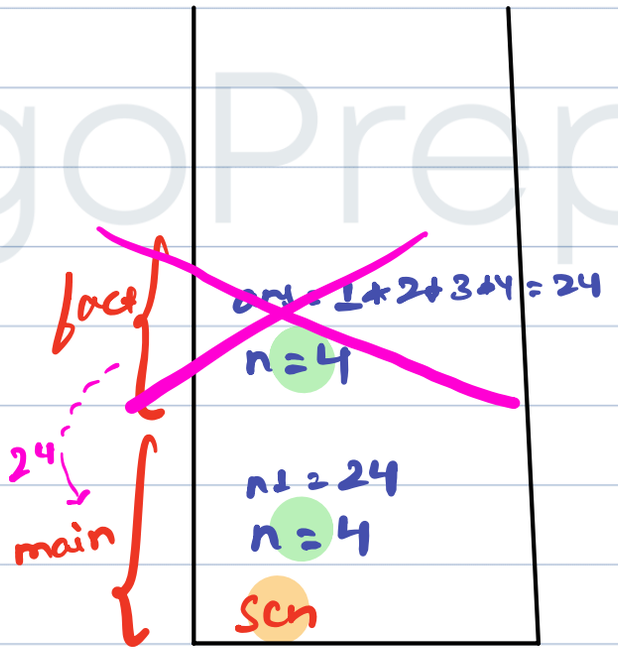
```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt(); → 5

    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;
    }

    S.O.P (ans);
}
```

```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt(); → 5

    int n1 = fact(n);
    S.O.P(n1);
}

Public static int fact (int n){
    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;
    }
    return ans;
}
```

→ Pass by value

call stack

```
main () {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt();
    int n1 = fact(4); → 24
    S.O.P(n1); → 24
}

Public static int fact (int n){
    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;
    }
}
```



→ return in function is equal to break in for loop.

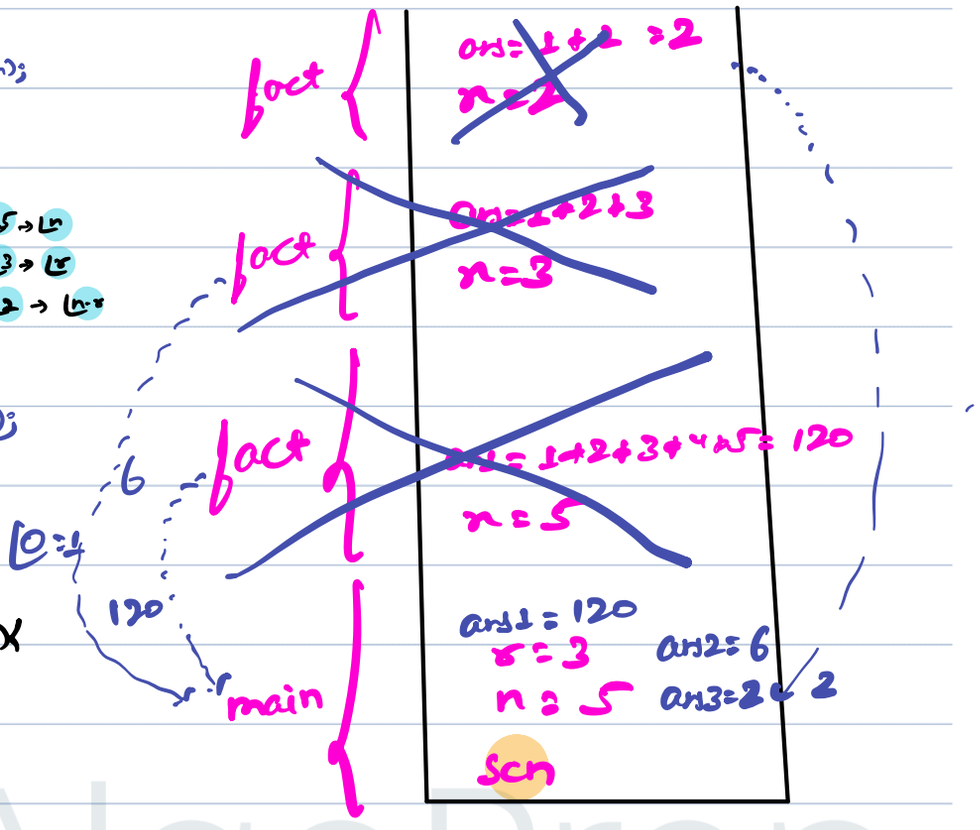
→ you can have function with no output. return type should be void.

Break till 10:35 PM

```
// ncr using function

main() {

    Scanner scn = new Scanner(System.in);
    int n = scn.nextInt(); → 5
    int r = scn.nextInt(); → 3

    int ans1 = fact(n);   // 5! → n!
    int ans2 = fact(r);   // 3! → r!
    int ans3 = fact(n-r); // 2! → (n-r)!

    int ans = ans1/(ans2*ans3);
    S.O.P(ans);

}

Public static int fact(int n){
    int ans=1;
    for(int i=1; i<=n; i++){
        ans = ans*i;
    }
    Return ans;
}
```

// ncr using function

```
main () {
    Scanner scn = new Scanner (System.in);
1   int n = scn.nextInt(); → 5
2   int r = scn.nextInt(); → 3

3   int ans1 = fact(n);   // 5 → 1
4   int ans2 = fact(r);   // 3 → 1
5   int ans3 = fact(n-r); // 2 → 1

6 → int ans = ans1/(ans2 * ans3);
7     S.O.P (ans);  → 10
}

Public static int fact (int n){
    int ans=1;
    for (int i=1; i<=n; i++) {
        ans = ans * i;
    }
→   return ans;
}
```



Quiz 4:

```
Public static void main (String[] args){
    1        Product(5,10);  50
}

Public static int Product (int a, int b){
    return a*b;
}
```

→ No output

Quiz 5:

```
Public static void main (String[] args){
    int ans = Subtract(5,10);
    System.out.println(ans);
}

Public static void Subtract (int a, int b){
    return a - b;
}
```

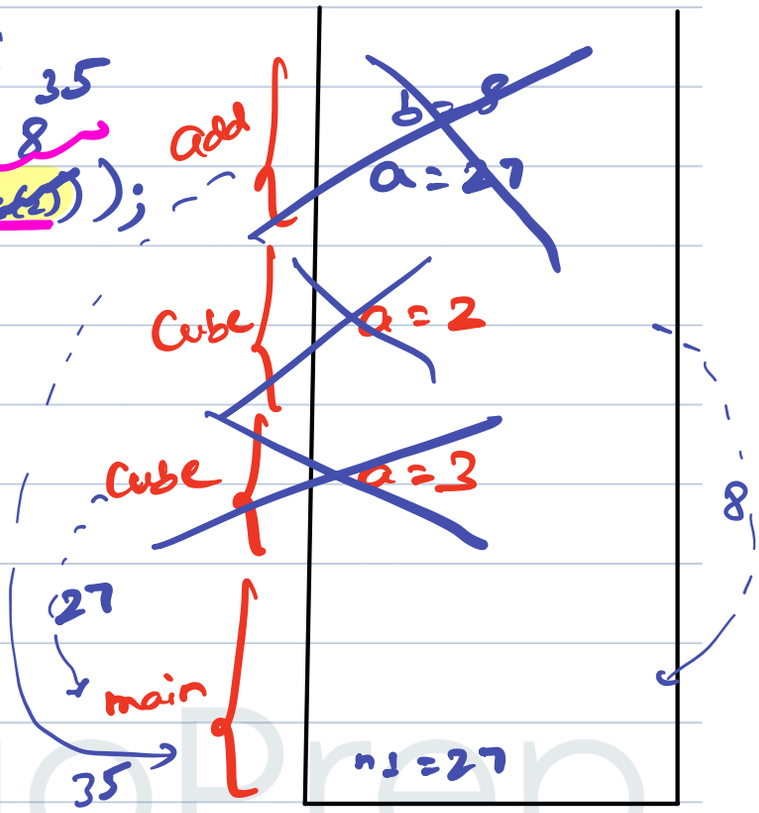
→ 5, → 10

→ error

Quiz 6:

```
Public static void main (String[] args){
    int n1 = cube(3);
    → System.out.println( add(2, cube(2)) );
}

Public static int add (int a, int b){
    return a+b;
}

Public static int cube (int a){
    → return a*a*a;
}
```

35 27 8



↳ 35