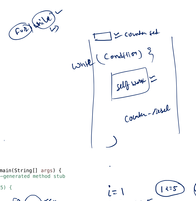
Lec-4
10/10/25 9:00 AM




```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int i = 1;
    while (i <= 5) {
        i++;
    }
    for (int j = 1; j <= 5; j++) {
        System.out.println(j);
    }
}
```

i=1 1<=5 1<5
i=2 2<=5 2<5
i=3 3<=5 3<5
i=4 4<=5 4<5
i=5 5<=5 5<5
i=6

Prime → 1 → 1 & itself → 2

11 → 11 → 1 & 11 → 2

N → check prime

i=2 to n-1

n=5

2 to n-1

1 to count=0

count++.

count==1 → prime

count==2 → not prime

```
public static void main(String[] args) {
    int n = 9;
    int count = 0;
    for (int i = 1; i <= n; i++) {
        if (n%i==0) {
            count++;
        }
    }
    if(count==1) {
        System.out.println("Not prime");
    }
    else {
        System.out.println("Prime");
    }
}
```

i=1→3 2<9 9%2==0 → 9/2==0

2<9 4 5 6 7 8

i=2 3<9 9%3==0 → 9/3==0

```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int n = 5;
    for (int i = 0;[ i <= n ] i++) {
        if (i == 2) {
            continue;
        }
        System.out.println(i);
    }
}
```

i=0 0<=5 0
i=1 1<=5 1
i=2 2<=5 2
i=3 3
i=4

Fibo

n=7 → 0 1 1 2 3 5 8 13 21 34 55 89 144 ...

a b

a=0 b=1

① c=a+b → c=1 | ② c=a+b → c=2, a=b=1, b=c | ③ c=a+b → c=3, a=b=2, b=c | ④ c=a+b → c=5, a=b=3, b=c | ⑤ c=a+b → c=8, a=b=5, b=c | ⑥ c=a+b → c=13, a=b=8, b=c

Fib(5) → fib(4) + fib(3) → fib(3) + fib(2) + fib(2) + fib(1) → fib(2) + fib(1) + fib(1) + fib(1) + fib(1)

2

2345

2+3+4+5 = 14

2345 / 10 = 234 r 5

sum = 0 → sum = sum + n%10 → n = n/10

2345 / 10 = 234

234 / 10 = 23 r 4

23 / 10 = 2 r 3

2 / 10 = 0

n=328

sum=0+8 = 8+2 = 10+8 = 18

328 % 10 = 8

n = 328 / 10 = 32

32 % 10 = 2

n = 32 / 10 = 3

3 % 10 = 3

n = 3 / 10 = 0

while (n>0) {
sum = n%10
n = n/10
}

sum = sum + n%10

n = n/10

sum = 18

2345 = 234×10+5 = 23×10+4 = 2×10+3

n = 2345 → 234 → 23 → 2

sum = 2+3+4+5

n = 2345

2345 → 234×10+5 = 23×10+4 = 2×10+3

n = 2345 → 234 → 23 → 2

sum = 0+5 → sum = sum + n%10 → n = n/10

GCD

① 36 | 36 → 36 | 36 → 0

dividend

divisor

36 | 36 → 1

36 | 36 → 1

36 = 1 2 3 4 6 9 12 18 36

60 = 1 2 3 4 5 6 10 12 15 20 30 60

21, 2, 3, 4, 6, 12

H.C.F

dividend = 6536624

divisor = 38 824 12

while (div and dividend > 0) {

int rem = dividend % divisor;

dividend = divisor;

divisor = rem;

}

System.out.println(divisor);

dividend = divisor

divisor = rem

Stop when divisor = 0

36 | 60 → 36 | 60 → 24 → 36 | 60 → 24 → 12 → 24 | 36 → 24 → 0

H.C.F

LCM

```
public static void main(String[] args) {
    // TODO Auto-generated method stub
    int dividend = 36;
    int divisor = 60;
    while (dividend % divisor != 0) {
        int rem = dividend % divisor;
        dividend = divisor;
        divisor = rem;
    }
    System.out.println(divisor);
}
```

36 | 60 → 36 | 60 → 0

36 | 60 = 0

Sum 4m 2m

gcd(4,2) × lcm(4,2) = 4×2

lcm(4,2) = (4×2) / gcd(4,2)

Pascal-Triangle

nCR

nCR

S = A B C D E

S C 3 → D C E

D E F

D F G

S1 = 1+1+1+1+1 = 5 = 5×1

Take N (number of rows), print the following pattern (for N = 6)

1
11
121
1331
14641
15 10 10 5 1

$^nC_R = \frac{n!}{(n-R)! \times R!}$

$^5C_3 = \frac{5!}{(5-3)! \times 3!} = \frac{5\times4\times3!}{2\times1\times3!} = \frac{20}{2} = 10$

$^4C_1 = \frac{4!}{(4-1)! \times 1!} = \frac{4\times3\times2\times1}{3\times2\times1\times1} = 4$

$^nC_0 = \frac{n!}{n!(n-1)!}$

Row 1 → $^0C_0$

1 1 → $^1C_0$ $^1C_1$

2 1 2 1 → $^2C_0$ $^2C_1$ $^2C_2$

3 1 3 3 1 → $^3C_0$ $^3C_1$ $^3C_2$ $^3C_3$

4 1 4 6 4 1 → $^4C_0$ $^4C_1$ $^4C_2$ $^4C_3$ $^4C_4$

5 1 5 10 10 5 1 → $^5C_0$ $^5C_1$ $^5C_2$ $^5C_3$ $^5C_4$ $^5C_5$

$^nC_R \rightarrow {}^nC_{R+1}$

$^nC_R = \frac{n!}{(n-R)! \times R!}$ — ①

$^nC_{R+1} = \frac{n!}{(n-(R+1))! \times (R+1)!}$ — ②

① ÷ ②

$\frac{^nC_{R+1}}{^nC_R} = \frac{n!}{(n-R-1)! \times (R+1)!} \times \frac{(n-R)! \times R!}{n!}$

$= \frac{(n-R)! \times R! \times R!}{(n-R-1)! \times (R+1)! \times n!}$

$\frac{^nC_{R+1}}{^nC_R} = \frac{(n-R)! \times R!}{(R+1)! \times n!}$

$\frac{^nC_{R+1}}{^nC_R} = \frac{(n-R)!}{(R+1)!} \times \frac{R!}{n!}$

$\frac{^nC_{R+1}}{^nC_R} = \frac{n-R}{R+1}$

$^nC_{R+1} = \left(\frac{n-R}{R+1}\right) {}^nC_R$

$^nC_R = \frac{n}{R} \times {}^{n-1}C_{R-1}$

$\frac{n}{R} = \frac{n}{n-1} \times \frac{n-1}{R}$

$\frac{n}{R} = \frac{n}{n-1} \times {}^{n-1}C_{R-1}$

$^nC_{R+1} = \left(\frac{n-R}{R+1}\right) {}^nC_R$