n^{th} power of 2

take input a no. n

output $\Rightarrow 2^n$

e.g., $n = 3$, o/p $= 2^3 = 8$

$n = 4$, o/p $= 2^4 = 16$

logic

$$2^n = 2 * 2 * 2 * 2 * \cdots\cdots$$

n times

```
     int ans = 1;
1)   for (int i = 0; i < n; i++) {
2)       ans = ans * 2;
3)   }
4)   System.out.println(ans);
```

$\boxed{n = 5}$, ans $= 2^5 = 32$

$\boxed{5 < 5}$ ✗

$\boxed{ans \ *= 2\,;}$

ans $= 1$

$i = 0$, ans $= 1 * 2 = 2$

$i = 1$, ans $= 2 * 2 = 4$

$i = 2$, ans $= 4 * 2 = 8$

$i = 3$, ans $= 8 * 2 = 16$

$i = 4$, ans $= 16 * 2 = \boxed{32}$

0   1   2   3   4   5   6   7   8   9

Quel Input a and b, output a^b

```
int ans = 1;
for (int i = 0; i < b; i++) {
    ans = ans * a;
}
System.out.println(ans);
```

n, $2^n = 2 * 2 * 2 \, \cdots\cdots$

n times

a, b, $a^b = a * a * a \, \cdots\cdots$

b times

Print powers of 2 less than n

```java
int n = scn.nextInt();
1) int ans = 1;
   for ( int i = 0; ans < n; i++) {
2)     System.out.print(ans + " ");
3)     ans = ans * 2;
   }
```

console

```
1_2_4_8_16_
```

e.g.,

$n = 20$

$ans = 1$

$i = 0, \quad ans = 1*2 = \underline{2} < 20$

$i = 1, \quad ans = 2*2 = \underline{4} < 20$

$i = 2, \quad ans = 4*2 = \underline{8} < 20$

$i = 3, \quad ans = 8*2 = 16 < 20$

$i = 4, \quad ans = 16*2 = 32 < 20 \quad \alpha$

$\hookrightarrow$ **Inbuilt functions**

Character . toUpperCase () // we to convert lower case letters into uppercase

Character . toLower Case () // we to convert uppercase letters into lowercase

```java
// for (int i = 97; i <= 122; i+=2) {
//     System.out.println( (char)i );
// }

int i = 97;
while (i <= 122) {
    System.out.println( (char)i );
    i+=2;
}
```

dual

```java
int pos = 1;
for (int i = 97; i <= 122; i++) {
    char ch = (char)i;
    if ( pos % 2 == 0 ) {   // even
        ch = Character.toUpperCase(ch);
    } else {
        ch = Character.toLowerCase(ch);
    }
    System.out.println(ch);
    pos++;
}
```

$a, b, c, d, e, f, \cdots \cdots , Z$

$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \quad \cdots \cdots \uparrow$

$1 \ 2 \ 3 \ 4 \ 5 \ 6 \qquad 26$

o/p → a B c D e F g $\cdots$ Z

$(pos \% 2 == 0) \rightarrow$ **even**

Toggle the character

```java
Scanner scn = new Scanner(System.in);
char ch = scn.next().charAt(0);

1) if ( ch >= 'a' && ch <= 'z' ) {
2)     System.out.println( (char)(ch - 32) );
3) } else if (ch >= 'A' && ch <= 'Z') {
4)     System.out.println( (char)(ch + 32) );
5) }
```

$\boxed{32}$

$a = 97 \longleftrightarrow A = 65$

$b = 98 \qquad\qquad B = 66$

$c = 99 \qquad\qquad C = 67$

$z = 122 \qquad\qquad z = 90$

⇒ Fibonacci series :-

0   1   1   2   3   5   8   13   21 ------

definition :- current value is sum of prev. 2 values

Print fibo. series :-