

# Assignment #2

1. Imagine you have a special keyboard with the following keys:

Key 1: Prints 'A' on screen

Key 2: (Ctrl-A): Select screen

Key 3: (Ctrl-C): Copy selection to buffer

Key 4: (Ctrl-V): Print buffer on screen appending it after what has already been printed.

If you can only press the keyboard for N times (with the above four keys), write a program to produce maximum numbers of A's. That is to say, the input parameter is N (No. of keys that you can press), the output is M (No. of A's that you can produce).

## Input:

The first line of input contains an integer T denoting the number of test cases.

The first line of each test case is N, N is the number of keys.

## Output:

Print maximum number of A's.

## Constraints:

$1 \leq T \leq 50$

$1 \leq N \leq 75$

## Example:

### Input:

2

3

7

### Output:

3

9

### Explanation:

Input: N = 3

Output: 3

We can at most get 3 A's on screen by pressing following key sequence.

A, A, A

Input: N = 7

Output: 9

We can at most get 9 A's on screen by pressing following key sequence.

A, A, A, Ctrl A, Ctrl C, Ctrl V, Ctrl V

**(Asked by Amazon & Google)**

## Q.2. JUMPING NUMBERS

Given a positive number  $x$ , print all Jumping Numbers smaller than or equal to  $x$ . A number is called as a Jumping Number if all adjacent digits in it differ by 1. The difference between '9' and '0' is not considered as 1. All single digit numbers are considered as Jumping Numbers. For example 7, 8987 and 4343456 are Jumping numbers but 796 and 89098 are not.

### Input:

The first line of the input contains  $T$  denoting the number of testcases. Each testcase contain a positive number ' $x$ '.

### Output:

All the jumping numbers less than ' $x$ ' are generated in increasing order of the most significant digit. See example for better understanding.

### Constraints:

$1 \leq T \leq 100$

$1 \leq N \leq 100000$

### Example:

#### Input:

3  
10  
50  
102

#### Output:

0 1 10 2 3 4 5 6 7 8 9

0 1 10 12 2 21 23 3 32 34 4 43 45 5 6 7 8 9

0 1 10 12 101 2 21 23 3 32 34 4 43 45 5 54 56 6 65 67 7 76 78 8 87 89 9 98

Here, the most significant digits of each jumping number is following increasing order, i.e., jumping numbers starting from 0, followed by 1, then 2 and so on, themselves being in increasing order 2, 21, 23.

(GOOGLE, AMAZON, Microsoft, Directi, Oracle)

**Q.3.**

Given an array A of integers, find the maximum of  $j - i$  subjected to the constraint of  $A[i] \leq A[j]$ .

**Example :**

**A : [3 5 4 2]**

**Output : 2**

**for the pair (3, 4)**

**Input:**

The first line contains an integer T, depicting total number of test cases.

Then following T lines contains an integer N depicting the size of array and next line followed by the value of array.

**Output:**

Print the maximum difference of the indexes i and j in a separate line.

**Constraints:**

$1 \leq T \leq 30$

$1 \leq N \leq 1000$

$0 \leq A[i] \leq 100$

**Example:**

**Input**

1

2

1 10

**Output**

1

**Note: Time:  $O(n)$  & Space:  $O(n)$**