Computer Science 320SC – 2017

Assignment 3 – programming

Due: September 11 (9pm)

Requirements

This assignment lets you get familiar with divide-and-conquer algorithm design. It is worth 5% of your total course marks.

Problem: Which digit?

A single positive integer i is given. Write a program to find the digit located in position i in the following infinite sequence of digits created by juxtaposing the increasing larger sequences of incremented integers $1, 2, 3, \ldots$. For example, the first 80 digits of the sequence are as follows:

11212312341234512345612345671234567812345678912345678910123456789101112345678910

The first line of the input (stdin/keyboard) contains a single integer n ($1 \leq n \leq 100$), the number of test cases, followed by one line for each test case. The line for a test case contains the single integer i ($1 \leq i < 10^{10}$).

There should be one output line per test case containing the digit located in position i.

Sample Input	**Sample Output**
3 8 3 21	2 2 6

Submission

Again we plan to set up test cases for automated marking for this problem. For this assignment name your source code `digitE.ext` or `digitH.ext`, where `ext` denotes one of { `java`, `cpp`, `cs`, `py` } that indicates java/c++/csharp/python language. Please use just one source file per problem. Here the suffix `E` of the basename denotes 'E'asy (test data) and `H` denotes 'H'arder (test data), with 3 and 2 marks given, respectively. (Alternatively, the automarker now handles a single submission for testing both test cases—use filename `digit.ext` for this feature.)