Sample Computer Science I Program: Su-Do-Kode

Please consult Webcourse for the due date/time

Dave has become addicted to Sudoku, the latest puzzle craze in all the newspapers and bookstands. In case you don't know, a Sudoku is a simple number puzzle played on a 3x3 grid of 3x3 subgrids. Below is an example:

	5	7		4	8	9		
			5		9			
	4	8				5	3	6
	2				6			7
	6		1	9	7		8	
7			3				6	
6	3	2				8	5	
			8		3			
		5	2	6		4	7	

Initial Puzzle

3	5	7	6	4	8	9	1	2
2	1	6	5	3	9	7	4	8
9	4	8	7	1	2	5	3	6
5	2	1	4	8	6	3	9	7
4	6	3	1	9	7	2	8	5
7	8	9	3	2	5	1	6	4
6	3	2	9	7	4	8	5	1
1	7	4	8	5	3	6	2	9
8	9	5	2	6	1	4	7	3

Solution

The object of Sudoku is to place numbers 1 through 9 in the empty spaces such that no row, column, or 3x3 subgrid has any number more than once. An interesting property of Sudoku puzzles is that there is always only one possible solution, and it can always be determined using logic, without the need for guessing. Although Dave is wild about Sudoku, he still comes up with incorrect solutions. Dave is tired of being made fun of by his more Sudoku savvy friends, so he's asked you to write a program to check his solutions for him.

Dave would like to give you his completed Sudoku puzzle solutions to have you determine which ones are correct, and which are invalid. For a Sudoku solution to be correct, every row, column, and 3x3 subgrid of the puzzle must have each digit (1 through 9) exactly once.

Input Format (Input will be tested from standard input)

The input will consist of 9 lines, each containing 9 digits. Each of these digits will be in the range 1 through 9, inclusive. The input represents one of Dave's potential Sudoku puzzle solutions, with the first line being the first row of his Sudoku solution, the second line being the second row of his Sudoku solution, and so forth.

Output Specification

Print a single line with the word "YES" (no quotes) if the puzzle is a valid solution to a Sudoku puzzle or the word "NO", if it is not.

Sample Input	Sample Output
357648912 216539748 948712536 521486397 463197285 789325164 632974851 174853629 895261473	YES
263847159 514936278 987125364 645382917 139574826 872619543 658791632 791263485 326458791	NO

Note about reading in a string of digits

There are multiple ways to read a string of digits into an integer array. Here is a segment of code that reads in one string of nine digits and stores it into an integer array of size 9:

```
#define SIZE 9

int i, row[SIZE];
char line[SIZE+1];
scanf("%s", line);

for (i=0; i<SIZE; i++)
    row[i] = line[i] - '0';
```

Since Ascii values of digits are stored contiguously, you can simply subtract the Ascii value of character that is a digit from the character '0' to obtain the value of that digit.

Deliverables

Please submit a single source file, *sudokode.c*, with your solution to this problem via Webcourses before the due date/time for the assignment. Make sure that your program reads from standard in and outputs to standard out. It is ***strongly*** suggested that you attempt a submission ***AT LEAST THREE HOURS*** before the actual due date/time to minimize the probability of intervening bad luck. We suggest this precisely because late programs automatically earn a 0 and one can earn up to 50% of the credit for a program that doesn't work at all. You are allowed to make multiple submissions before the due date of an assignment. (Note: Just for this first assignment, we'll allow a late turn in because of students who may have added the class late. For students who submit after the posted deadline, you will only get one submission, so please keep that in mind.)