CPro-Assignment 2

Lahari Sirisetti, Himani Belsare, Devesh Marwah
Computer Programming, Monsoon 2024
Deadline: 6th September, 2024. 11:59 PM

1 Fibonacci Puzzle

Once upon a time in a small village, a young boy named Ravi was known for his love of numbers. One day, his grandfather came to him with a puzzle. Grandfather said, "Ravi, I need your help. There is a special sequence of numbers called the Fibonacci series, where each number is the sum of the two before it. Can you find the first n numbers in this sequence for me?"

Ravi thought for a moment and decided to write a program to solve the puzzle. Can you help Ravi write a simple C program to display the first n terms of the Fibonacci series?

1.1 Input

- A single integer n, representing how many terms of the Fibonacci series Ravi needs to find.

1.2 Constraints

- $3 \leq n \leq 50$

1.3 Output

- Print the first n terms of the Fibonacci series in a single line, separated by spaces.

1.4 Example 1

Input: $n = 5$
Output: 0 1 1 2 3

1.5 Explanation:

In this example, $n = 5$, which means we need to print the first five terms of the Fibonacci series.

- The Fibonacci series starts with 0 and 1.

- Each subsequent term is the sum of the two preceding ones. So, $0 + 1 = 1$, $1 + 1 = 2$, and $1 + 2 = 3$.
- Therefore, the first five terms are 0 1 1 2 3.

1.6 Example 2

Input: $n = 7$
Output: 0 1 1 2 3 5 8

1.7 Explanation:

In this example, $n = 7$, which means we need to print the first seven terms of the Fibonacci series.

- The Fibonacci series starts with 0 and 1.
- The next terms are calculated as $0 + 1 = 1$, $1 + 1 = 2$, $1 + 2 = 3$, $2 + 3 = 5$, and $3 + 5 = 8$.
- Therefore, the first seven terms are 0 1 1 2 3 5 8.

2 Jolly Number

Write an algorithm to determine Jolly numbers upto N.
A Jolly number is defined by the following process:

1. Starting with any positive integer, replace the number by the sum of the squares of its digits.
2. Repeat the process until the number equals 1 (where it will stay), or it loops until a MAXIMUM of 100 iterations.
3. Those numbers for which this process ends in 1 are called Jolly numbers.

Print all Jolly Numbers from 1 upto N (included)

2.1 Input

- $1 \leq N \leq 10{,}000$

2.2 Output

- A list of all Jolly numbers upto N separated by spaces.

2.3 Example 1

Input: $N = 19$
Output: 1 7 10 13 19

Explanation: Following is the explanation for number 19

$1^2 + 9^2 = 82$
$8^2 + 2^2 = 68$
$6^2 + 8^2 = 100$
$1^2 + 0^2 + 0^2 = 1$

2.4 Example 2

Input: $n = 2$
Output: 1

2.5 Constraints

$1 \leq n \leq 10,000$

3 Devesh Numbers

A **Devesh number** is a positive integer that is divisible by the sum of its digits. For example, 12 is a Devesh number because the sum of its digits is $1+2=3$, and 12 is divisible by 3. Similarly, 18 is a Devesh number because the sum of its digits is $1+8=9$, and 18 is divisible by 9.

3.1 Task

Write a program that takes integers A and B as input and outputs all the Devesh numbers between them.

3.2 Input

- Integer A,B where
- $1 \leq A \leq 1,00,000$
- $1 \leq B \leq 1,00,000$
- $A \leq B$

3.3 Output

- A list of all Devesh numbers within the range A,B (both included) separated by spaces.

3.4 Example

Input:

```
1 30
```

Output:

```
1 2 3 4 5 6 7 8 9 10 12 18 20 21 24 27 30
```

3.5 Explanation

The Devesh numbers less than or equal to 30 are $1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 18, 20, 21, 24, 27, 30$.

4 Sudoku Solver

Determine if a 9×9 Sudoku board is valid according to the following rules:

1. Each row must contain the digits 1-9 without repetition.
2. Each column must contain the digits 1-9 without repetition.

Note: You only need to check the above mentioned rules to solve the problem.

4.1 Input

A 2D array with dimensions 9x9 containing digits from range 1 to 9.

4.2 Output

1 if the sudoku is valid and 0 if it is invalid.

4.3 Example

Input:

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

Output:

```
1
```

Explanation: The matrix follows rule of the sudoku.

Input:

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

Output:

```
0
```

Explanation: The first row has 2 occurrences of 5. The fifth column has 2 occurrences of 8.