Lab Assignment: Stack with O(1) getMin() and O(1) Extra Space

Problem Statement

Design a special stack that supports all the stack operations (push, pop, top) and also provides a function `getMin()` that returns the minimum element in the stack. All operations should be performed in **O(1)** time and **O(1)** extra space.

You are not allowed to use any other data structure such as an array, list, or another stack.

Implement the following operations:

- `void push(int x);`
  Push element `x` onto the stack.
- `void pop();`
  Remove the element on top of the stack.
- `int top();`
  Return the element on the top of the stack.
- `int getMin();`
  Return the minimum element in the stack in O(1) time and space.

Key Idea

We store **modified values** in the stack when pushing an element smaller than the current minimum. This allows tracking the current and previous minimums using **mathematical transformations**, so we can retrieve or update `min` efficiently during pop.

Example

```
push(3)
push(5)
getMin() → 3
push(2)
push(1)
getMin() → 1
pop()
getMin() → 2
```