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Next Greater Element

Given an array, print the Next Greater Element (NGE) for every element. The Next greater Element for an element x is the first greater element on the right side of x in array. Elements for which no greater element exist, consider next greater element as -1.

Examples:

- a) For any array, rightmost element always has next greater element as -1.
- b) For an array which is sorted in decreasing order, all elements have next greater element as -1.
- c) For the input array [4, 5, 2, 25], the next greater elements for each element are as follows.

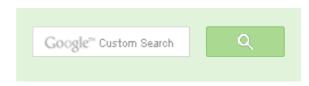
Element	1	NGE	
4	>	5	
5	>	25	
2	>	25	
25	>	-1	

d) For the input array [13, 7, 6, 12], the next greater elements for each element are as follows.

Element		NGE
13	>	-1
7	>	12
6	>	12
12	>	-1

Method 1 (Simple)

Use two loops: The outer loop picks all the elements one by one. The inner loop looks for the first greater element for the element picked by outer loop. If a greater element is found then that element is printed as next, otherwise -1 is printed.





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Thanks to Sachin for providing following code.

```
pchild for suggesting following approach. <br>
1) Push the first element to stack. <br>
2) Pick rest of the elements one by one and follow following steps in
....a) Mark the current element as <em>next</em>.<br>>
....b) If stack is not empty, then pop an element from stack and compa
....c) If next is greater than the popped element, then <em>next </em>
....d) Keep poppoing from the stack while the popped element is smalle
....q) If <em>next </em>is smaller than the popped element, then push
3) After the loop in step 2 is over, pop all the elements from stack as
#include<stdlib.h>
#define STACKSIZE 100
// stack structure
struct stack
   int top;
   int items[STACKSIZE];
};
// Stack Functions to be used by printNGE()
void push(struct stack *ps, int x)
   if (ps->top == STACKSIZE-1)
       printf("Error: stack overflow\n");
       getchar();
       exit(0);
   else
       ps->top += 1;
       int top = ps->top;
       ps->items [top] = x;
bool isEmpty(struct stack *ps)
   return (ps->top == -1)? true : false;
int pop(struct stack *ps)
```



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```
int temp;
    if (ps->top == -1)
        printf("Error: stack underflow \n");
        getchar();
        exit(0);
    else
        int top = ps->top;
        temp = ps->items [top];
        ps->top -= 1;
        return temp;
/* prints element and NGE pair for all elements of
arr[] of size n */
void printNGE(int arr[], int n)
    int i = 0;
    struct stack s;
    s.top = -1;
    int element, next;
    /* push the first element to stack */
    push(&s, arr[0]);
    // iterate for rest of the elements
    for (i=1; i<n; i++)</pre>
        next = arr[i];
        if (isEmpty(&s) == false)
            // if stack is not empty, then pop an element from stack
            element = pop(\&s);
            /* If the popped element is smaller than next, then
                a) print the pair
                b) keep popping while elements are smaller and
                stack is not empty */
            while (element < next)</pre>
                printf("\n %d --> %d", element, next);
                if(isEmpty(&s) == true)
                   break;
```





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