



BITS Pilani
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Data Structures and Algorithms (CS F211) – T5

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Suppose that each row of an $n \times n$ array A consists of 1's and 0's such that, in any row i of A , all the 1's come before any 0's in that row. Suppose further that the number of 1's in row i is at least the number in row $i + 1$, for $i = 0, 1, 2, \dots, n-2$. Assuming A is already in memory, describe an efficient method for counting the number of 1's in the array A .

Suppose that each row of an $n \times n$ array consists of 1's and 0's such that, in any row of A , all the 1's come before any 0's in that row. Assuming A is already in memory, describe an efficient method for finding the row of A that contains the most 1's.

Give a recursive algorithm to compute the product of two positive integers m and n using only addition.

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```
int multiply(int m, int n)
{
    int result;

    if (n == 1)
        result = m;
    else
        result = m + multiply(m, n-1);
    return(result);
}
```

Let S be a set of n lines such that no two are parallel and no three lines meet in the same point. Find out the number of intersection points.

Consider an implementation of the extendable table, but instead of copying the elements of the table into an array of double the size (that is, from N to $2N$) when its capacity is reached, we copy the elements into an array with $\lceil \sqrt{N} \rceil$ additional cells, going from capacity N to $N + \lceil \sqrt{N} \rceil$. Show that performing a sequence of n add operations (that is, insertions at the end) runs in $\Theta(n^{3/2})$ time in this case.

Implement a stack using two queues.

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This method makes sure that newly entered element is always at the front of 'q1', so that pop operation just dequeues from 'q1'. 'q2' is used to put every new element at front of 'q1'.

push(s, x) operation's step are described below:

- Enqueue x to q2

- One by one dequeue everything from q1 and enqueue to q2.

- Swap the names of q1 and q2

pop(s) operation's function are described below:

- Dequeue an item from q1 and return it.

Implement a queue using two stacks.









Thank You!!