

# 162 & 1901. Find Peak Element / II

☰ Category	Binary Search
☰ Difficulty	Medium
☰ Note	
☰ AC & Time	
🔗 Property	
☰ related	MIT 6.006 first class

## 162. Find Peak Element

```
class Solution {
public:
    int findPeakElement(vector<int>& nums) {
        //binary search; if (nums[mid] > nums[mid + 1]) right = mid
        // else left = mid + 1; find monotonic increasing part
        if (nums.size() <= 1) return nums.size() - 1;
        int left = 0, right = nums.size() - 1;
        while (left < right) {
            int mid = left + (right - left) / 2;
            if (nums[mid] < nums[mid + 1]) left = mid + 1;
            else right = mid;
        }
        return left;
    }
};
```

## 1901. Find a Peak Element II

```
class Solution {
public:
    vector<int> findPeakGrid(vector<vector<int>>& mat) {
        // binary search for col // n(logm)
        // two 2D ==> one D binary search * one D liner search
        int m = mat.size();
```

```

int n = mat[0].size();
int lo = 0, hi = m - 1;
while (lo < hi) {
    int mid = lo + (hi - lo) / 2;
    int topmax = 0;
    for (auto& num : mat[mid]) {
        if (num > topmax)
            topmax = num;
    }

    int downmax = 0;
    for (auto& num : mat[mid + 1]) {
        if (num > downmax)
            downmax = num;
    }

    if (topmax < downmax) lo = mid + 1;
    else hi = mid;
}
int gomax = mat[lo][0];
int indx = 0;
for (int i = 0; i < n; i++) {
    if (mat[lo][i] > gomax)
        indx = i;
    gomax = mat[lo][indx];
}
vector<int> res = {lo, indx};
return res;
}
};

```