Mostafa Saad (Channel + Sheet)

YouTube Channel: https://www.youtube.com/user/nobody123497/videos
Sheet:
https://docs.google.com/spreadsheets/d/1iJZWP2nS_OB3kCTjq8L6TrJJ4o-5lhxDOyTaocSYc-k/edit#gid=169095902

Upsolving

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01 | ICPC Preparation Online Contest 2016 #1

Final standings

Double click (or ctrl+click) each entry to view its submission histor

Standings

#	Who	=	Penalty	A	B	C	D	E	F	G	H	I	J	K
	Ahmad_Osama	2		+			+							
1	darksmith →to practice	11	92392	+ 5:19:27	+ 5:19:23	+ 5:19:32	+ 5:19:36	+1 5:20:00	+1 5:20:10	+ 5:20:11	+ 5:20:12	+ 5:20:12	+ 5:20:13	+ 5:20:16
2	ohmar →to practice	10	48593	+ 04:36	+ 04:47	+ 05:12	+2 5:18:33		+2 6:07:37	+ 1:02:48	+ 6:06:36	+ 6:05:41	+1 6:03:56	+1 1:04:07
3	nouran_montaser →to practice	7	12023	+ 05:31	+ 05:45	+ 04:00	-5		+ 03:52	+ 1:01:30		+ 3:05:54	+ 3:05:51	
4	YomnaHAmin →to practice	7	40243	+ 01:01	+2 01:14	+ 01:46	-2		-2	+ 6:20:01	+ 6:22:31	+ 6:23:36	+ 6:23:54	
5	7amadz →to practice	6	20300	+ 1:19:52	+ 1:19:59	+ 2:10:44	+2 2:12:09		+ 2:22:13				+ 2:12:43	
6	A.Magdy96 →to practice	6	34081	+ 4:08:49	+1 2:07:59	+ 4:09:03	-10		+2 4:09:27	+ 2:08:21		+ 5:19:22		-8
7	SamuelFarid →to practice	5	8314	+ 1:02:54	+ 1:03:01	+ 1:03:26			+3 1:04:30	+ 1:03:43				-4
8	amira_atef →to practice	0	0											
8	perihaneyoussef96 →to practice	0	0	-5										
	* nouran_montaser	4					+	+			+			+
	* Musta_Mohamed	1						+						
	Accepted Tried			8 9	7 7	7 7	5 8	3 3	6 7	6 6	4 4	5 5	5 5	3 5

Palindromes: http://codeforces.com/group/dwsLKsQhIS/contest/208383/problem/E
Brute Force (What is it? Is it good? Is it always right?)

```
#include "bits/stdc++.h"
using namespace std;
bool ispalindrome(const string & s)
{
  for(int i=0;i<s.size()/2;i++)
    if(s[i]!=s[s.size()-1-i])
      return 0;
  return 1;
}
```

```
int main()
{
  std::ios::sync_with_stdio(false);
  #ifndef ONLINE_JUDGE
    freopen("in.txt","r",stdin);
  #endif
  string s;
  cin>>s;
  string ans;

  for(int startin=0;startin<=s.size();startin++)
  {
    ans=s.substr(0,startin)+string(1,'a')+s.substr(startin);//a + s
    for(char c='a';c<='z';c++)
    {
      ans[startin]=c;
      if(ispalindrome(ans))
      {
        cout<<ans;
        return 0;
      }
    }
  }

  cout<<"NA";
  return 0;
}
```

Note:
func1 and func2 are equivalent.

```
bool func1()
{
if(x==2) return true;
else if(x==3) return false;
else return true;
}
bool func2()
{
if(x==2)return true;
if(x==3)return false;
return true;
}
```

Problem D : http://codeforces.com/group/dwsLKsQhIS/contest/208383/problem/D
What are the possibilities?

Good Note in Youmna's Code:
Always decide what happens in all scenarios.
If and else .

```
#include "iostream"
#include "string"
#include "math.h"

using namespace std;

int main(){
    string A;
    cin >> A;

    int AB = A.find("AB");
    int BA = A.find("BA");
    //cout << " " << AB << " " << BA;
    if(AB == -1 || BA == -1)
        cout << "NO";
    else if(abs(AB - BA) == 1){
        if(AB < BA){
            BA = A.find("BA",AB + 2);
            //cout << " " << AB << " " << BA;
            if(BA != -1)
                cout << "YES";
            else
                cout << "NO";
        }
        else {
            AB = A.find("AB",BA + 2);
            //cout << " " << AB << " " << BA;
            if(AB != -1)
                cout << "YES";
            else
                cout << "NO";
        }
    }
    else
        cout << "YES";

    //cout << " " << AB << " " << BA;
    return 0;
```

H: http://codeforces.com/group/dwsLKsQhIS/contest/208383/problem/H
Twins and coins.
Greedy Algorithm + Sorting
Always take max coin and it will always be part of the final answer

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K: http://codeforces.com/group/dwsLKsQhIS/contest/208383/problem/K
Greedy Algorithm?
If you have one 0 and ten 1 what will happen?
01111111111
Always the zero will be adjacent to a one.
If you have two 0 and ten 1 what will happen?
find count of zeros (cz) and count of one (co)
cout<<max(cz,co)-min(cz,co);

Template Functions and Classes Generic Programming

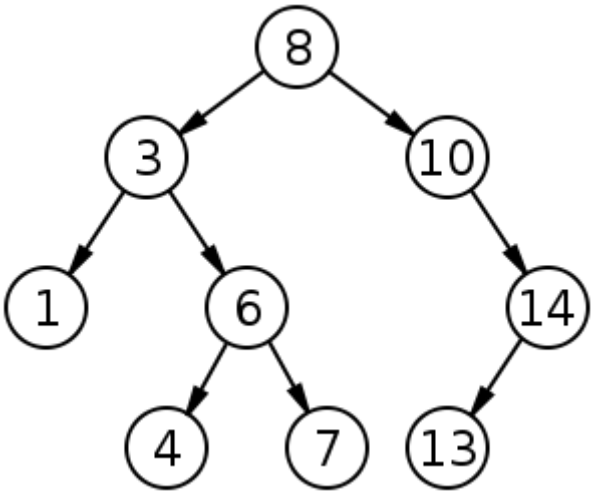
Template Function: (Swap function)
http://ideone.com/KRZWfZ
Template class:
http://ideone.com/An3imo
STL (Standard Template Library) (Template Classes):
-set
-map
-vector
-queue (FIFO)
-stack (FILO)
-deque
-……..
http://www.tutorialspoint.com/cplusplus/cpp_templates.htm
http://www.cplusplus.com/reference/stl/

Vectors (Dynamic Arrays)

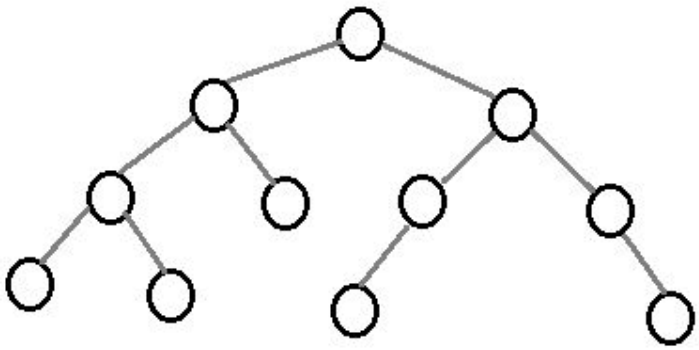
Where to find functions?
http://www.cplusplus.com/reference/vector/vector/
Why vectors?
-Pointers
-Smart size expansion
//5 → 6
//6 → 7
vector<int> v(5,100); // 100 100 100 100 100
v.push_back(200); // 100 100 100 100 100 200 (2*oldsize)
v.push_back(200);
-More organized Code (User Friendly)
-Template Class
Important Functions:
[]
size()
push_back()

constructor
vector<int> vec(5);//size of vector =5
vector<int> vec(5,2);//size of vector=5 and val=2 || 2 2 2 2 2

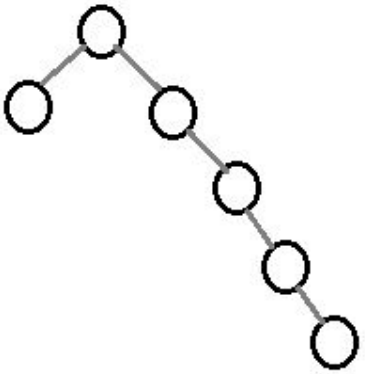
Binary Search Tree (BST) – New Data Structure (WOHOO)



Properties:
Terms: Node – Root – Edge – key/value – Balanced/Unbalanced tree
Each Node has two children only(binary).
Sorted according to the key value.



Balanced Binary Tree



Unbalanced Binary Tree

How to insert numbers of sequence: 8 3 10 1 6 14 4 7 13 to generate the above tree ?
Does order generates a different tree? Yes

Why ?
Basic Operations?

-insert: O(logn) -depth of tree
-search/find: O(logn) -depth of tree
-delete: O(logn) -depth of tree

Types of BST :
-Red Black Tree
-AVL Tree
-Splay Tree
-..

Sets:
Doesn’t allow duplicates
set<string> names;
set<int> numbers;
numbers.insert(2);
numbers.insert(3);
numbers.insert(5);

if(numbers.find(6)!=numbers.end())
cout<<”6 is found\n”;
else
cout<<”6 isn’t found \n”;

http://codeforces.com/problemset/problem/443/A
https://uva.onlinejudge.org/index.php?option=onlinejudge&page=show_problem&problem=1756

Maps:
A key/value data structure.
Sorted by the keys.

-Create a map:
map<string,int> scores;
-Add new value to map
scores[“amr”]=0;
scores[“omar”]=2;
-Edit value of a node in the map
scores[“amr”]++;
-Access a value by using its key
cout<<scores[“omar”]<<endl;

-Search for a key in the map
if(scores.find(“samuel”)==scores.end())
cout<<”Samuel hasn’t get a score yet”;

-Print all key/value pairs in the map

```
for(map<string,int>::iterator it=mp.begin();it!=mp.end();++it)
{
        cout<<(*it).first<<” “<<(*it).second<<endl;
}
```

C++11:
http://ideone.com/zmnDQe

https://uva.onlinejudge.org/index.php?option=onlinejudge&page=show_problem&problem=1223
https://uva.onlinejudge.org/index.php?option=onlinejudge&page=show_problem&problem=425