Imperial College of Engineering

(Rajshahi University Affiliated)
Jessore Road, Boikali, Khulna-9000

Lab Report

Course Code	**CSE2222**
Course Title	**Design and Analysis of Algorithms Lab**

Submitted to

Md. Rajib Hossain
Lecturer, Dept of CSE
Imperial College of Engineering

Submitted by

Fahim Ahammed Firoz
ID: 1938520126
Part-2, Odd Semester
Dept. of CSE
Imperial College of Engineering

Problem 1: Mice and maze

```
#include<bits/stdc++.h>
using namespace std;
#define MX 105
#define INF 1000000000
struct node{
   int val;
   int cost;
};

vector < node > G[MX];
bool vis[MX];
int dist[MX];

void reset(){
   for (int i = 0; i < MX; i++){
      G[i].clear();
      vis[i] = 0;
      dist[i] = INF;
   }
}

class cmp{
public:
   bool operator() (node &A, node &B){
      if (A.cost > B.cost) return true;
      return false;
   }
};

int dijkstra(int source, int Time){
   priority_queue<node, vector<node>, cmp> PQ;
   PQ.push({source, 0});
   int cnt = 0;
   while(!PQ.empty()){
      node current = PQ.top();
      PQ.pop();
      int val = current.val;
      int cost = current.cost;
      if (vis[val] == 1) continue;
      dist[val] = cost;
      vis[val] = 1;
      if (dist[val] <= Time){
         cnt++;
      }
      for (int i = 0; i < G[val].size(); i++){
         int nxt = G[val][i].val;
         int nxtCost = G[val][i].cost;
         if (vis[nxt] == 0){
            PQ.push({nxt, cost + nxtCost});
         }
      }
```

```
    }
    return cnt;
}

int main()
{
    //freopen("input.txt", "r", stdin);
    int test;
    scanf("%d", &test);

    for (int cs = 1; cs <= test; cs++){
        reset();
        int n, e, t;
        scanf("%d%d%d", &n, &e, &t);
        int m;
        scanf("%d", &m);
        for (int i = 1; i <= m; i++){
            int u, v, w;
            scanf("%d%d%d", &u, &v, &w);
            G[v].push_back({u, w});
        }
        int ans = dijkstra(e, t);
        if (cs > 1) printf("\n");
        printf("%d\n", ans);
    }
    return 0;
}
```

Problem-2: Cheeky Cheeky:

```
#include <iostream>
#include <string>
using namespace std;
int main(){
    int t;
    cin>>t;
    while(t--){
        ws(cin);
        string s;
        cin>>s;
        int n=s.size();
        cout<<"size: "<<n<<endl;
        int len=n/3+1;
        cout<<"len: "<<len<<endl;
        if(len<1){
            cout<<"len < 1 : "<<len<<endl;
            len=1;
        }
        string ans;
        while(len<=n/2){
            cout<<"len <= N/2 : "<<len<<endl;
            string tmp=s.substr(n-len,len);
```

```
            if(tmp==s.substr(n-2*len,len))
                ans=tmp;
                cout<<"ans tmp : "<<ans<<endl;
            len++;
        }
        for(int i=0;i<8;i++)
            cout<<ans[i%ans.size()];
        cout<<"..."<<endl;
    }
}
```

Problem-3: Palindrome:

```
#include <iostream>
using namespace std;

void solve();
int main(){
    int t;
    cin >> t;
    while (t--){
        solve();
    }
    return 0;
}

void solve(){
    int a;
    cin >> a;
    int arr[a];
    for (int i = 0; i < a; i++)
        cin >> arr[i];
    bool flag = false;
    for (int i = 0; i < a; i++){
        for (int j = i + 2; j < a; j++){
            if (arr[i] == arr[j]){
                flag = true;
            }
        }
    }

    if (a==1 || flag)cout << "YES" << endl;
        else cout << "NO" << endl;
}
```

Problem-4:

```
#include<iostream>
using namespace std;
typedef long long ll;

vector<ll>pi;

void preFunc(string s){
```

```
    ll len=s.size();
    pi.resize(len+5);
    pi[0]=0;
    for(ll i=1;i<len;i++){
        ll j=pi[i-1];
        while(j>0&&s[i]!=s[j])j=pi[j-1];
        if(s[i]==s[j])j++;
        pi[i]=j;
    }
}

int main(){

    ll t;
    cin>>t;
    while(t--){
        string s;
        cin>>s;
        ll len=s.size();
        reverse(s.begin(),s.end());
        preFunc(s);
        ll idx;
        for(ll i=len-1;i>=0;i--){
            if(pi[i]*2==(i+1)){
                idx=pi[i]-1;
                break;
            }
        }
        string ans="";
        for(ll i=0;i<=idx;i++)ans+=s[i];
        len=ans.size();
        ll rep=0;
        if(len<8){
            rep=(8/len);
            if(8%len!=0)rep++;
        }
        for(ll i=0;i<rep;i++){
            ans+=ans;
        }
        reverse(ans.begin(),ans.end());
        for(ll i=0;i<8;i++)cout<<ans[i];
        cout<<"...\n";
    }
    return 0;
}
```