# 数论

### 筛选法素数打表

void isPrime()

{

for (int i = 2; i < N; i++)

if (!a[i])

for (int j = i + i; j < N; j += i)

a[j] = 1;

}

### 组合数

//扩展欧几里得求组合数

LL fac[N];

void init()

{

LL i;

fac[0]=1;

for (LL i = 1; i < N; i++)

fac[i] = fac[i - 1] \* i % MOD;

}

LL exgcd(LL a, LL b, LL &x, LL &y) {

if (!b) {x = 1; y = 0; return a;}

LL d = exgcd(b, a % b, y, x);

y -= a / b \* x;

return d;

}

LL inv(LL a, LL n) {

LL x, y;

exgcd(a, n, x, y);

return (x + n) % n;

}

LL C(LL n, LL m) {

return fac[n] \* inv(fac[m] \* fac[n - m] % MOD, MOD) % MOD;

}

//递推求O(n^2)

int comb[N][N];//comb[n][m]就是C(n,m)

void init(){

for(int i = 0; i < N; i ++){

comb[i][0] = comb[i][i] = 1;

for(int j = 1; j < i; j ++){

comb[i][j] = comb[i-1][j] + comb[i-1][j-1];

comb[i][j] %= MOD;

}

}

}

### 线性基

const int MN=60;

ll a[61],tmp[61];

bool flag;

void ins(ll x){

for(reg int i=MN;~i;i--)

if(x&(1ll<<i))

if(!a[i]){a[i]=x;return;}

else x^=a[i];

flag=true;

}

bool check(ll x){

for(reg int i=MN;~i;i--)

if(x&(1ll<<i))

if(!a[i])return false;

else x^=a[i];

return true;

}

ll qmax(ll res=0){

for(reg int i=MN;~i;i--)

res=max(res,res^a[i]);

return res;

}

ll qmin(){

if(flag)return 0;

for(reg int i=0;i<=MN;i++)

if(a[i])return a[i];

}

ll query(ll k){

reg ll res=0;reg int cnt=0;

k-=flag;if(!k)return 0;

for(reg int i=0;i<=MN;i++){

for(int j=i-1;~j;j--)

if(a[i]&(1ll<<j))a[i]^=a[j];

if(a[i])tmp[cnt++]=a[i];

}

if(k>=(1ll<<cnt))return -1;

for(reg int i=0;i<cnt;i++)

if(k&(1ll<<i))res^=tmp[i];

return res;

}

# 图

### 链式前向星

//存储结构

struct Edge {

int to; //边的终点

int w; //边的权值

int next; //起点相同的下一条边

} edge[M]; //M 为边数，N 为顶点数

int head[N]; //head[i]是以 i 为起点的第一条边的编号

int cnt; //记录边数

//初始化

cnt = 0;

memset(head, -1, sizeof(head));

//建图

void addEdge(int u, int v, int w)

{

edge[cnt].to = v;

edge[cnt].w = w;

edge[cnt].next = head[u];

head[u] = cnt++;

}

//遍历以 u 为起点的邻接边

for (int i = head[u]; i != -1; i = edge[i].next) {

int to = edge[i].to; //终点

int w = edge[i].w; //权值

}

Dinic算法

const int maxn=300;

const int INF=0x3f3f3f3f;

struct Edge{

int to,next,cap;

}edge[maxn\*maxn];

int head[maxn],tot;

int dep[maxn],cur[maxn];

void init(){

tot=0;

memset(head,-1,sizeof(head));

}

void addEdge(int u,int v,int c){

edge[tot].to=v;edge[tot].cap=c;

edge[tot].next=head[u];head[u]=tot++;

edge[tot].to=u;edge[tot].cap=0;

edge[tot].next=head[v];head[v]=tot++;

}

bool bfs(int s,int t){

memset(dep,-1,sizeof(dep));

for(int i=1;i<=n;i++)cur[i]=head[i];

queue<int> que;

dep[s]=0;

que.push(s);

while(que.size()){

int u=que.front();que.pop();

for(int i=head[u];i!=-1;i=edge[i].next){

int v=edge[i].to;

if(edge[i].cap>0&&dep[v]==-1){

dep[v]=dep[u]+1;

que.push(v);

}

}

}

if(dep[t]!=-1)return true;

return false;

}

int dfs(int now,int t,int limit){

if(!limit||now==t)return limit;

int flow=0,f;

for(int i=cur[now];i!=-1;i=edge[i].next){

cur[now]=i;

int v=edge[i].to;

if(dep[v]==dep[now]+1&&(f=dfs(v,t,min(limit,edge[i].cap)))){

flow+=f;

limit-=f;

edge[i].cap-=f;

edge[i^1].cap+=f;

if(!limit)break;

}

}

return flow;

}

int dinic(int s,int t){

int maxflow=0;

while(bfs(s,t)){

maxflow+=dfs(s,t,INF);

}

return maxflow;

}

# 数据结构

### Treap

const int maxn=1e5+5;

const int INF=2e9+7;

struct Treap {

int ch[maxn][2];//结点左右儿子

int val[maxn],dat[maxn];//基本值和优先级

int size[maxn],cnt[maxn];//子树大小，结点副本数

int tot,root;

int New(int v) {

val[++tot]=v;

dat[tot]=rand();//随机优先级

size[tot]=1;

cnt[tot]=1;

return tot;

}

void pushup(int id) {

size[id]=size[ch[id][0]]+size[ch[id][1]]+cnt[id];

}

void build() {

root=New(-INF),ch[root][1]=New(INF);

pushup(root);

}

void rotate(int& id,int d) { //id是引用传递，d(irection)为旋转方向，0为左旋，1为右旋

int temp=ch[id][d^1];

ch[id][d^1]=ch[temp][d];

ch[temp][d]=id;

id=temp;

pushup(ch[id][d]),pushup(id);

}

void insert(int& id,int v) {

if(!id) {

id=New(v);

return;

}

if(v==val[id])cnt[id]++;

else {

int d=v<val[id]?0:1;

insert(ch[id][d],v);

if(dat[id]<dat[ch[id][d]])rotate(id,d^1);

}

pushup(id);

}

void remove(int&id,int v) {

if(!id)return;

if(v==val[id]) {

if(cnt[id]>1) {

cnt[id]--,pushup(id);

return;

}

if(ch[id][0]||ch[id][1]) {

if(!ch[id][1]||dat[ch[id][0]]>dat[ch[id][1]]) {

rotate(id,1),remove(ch[id][1],v);

} else {

rotate(id,0),remove(ch[id][0],v);

}

pushup(id);

} else id=0;

return;

}

v<val[id]?remove(ch[id][0],v):remove(ch[id][1],v);

pushup(id);

}

int getRank(int id,int v) {

if(!id)return 0;

if(v==val[id])return size[ch[id][0]]+1;

else if(v<val[id])return getRank(ch[id][0],v);

else return size[ch[id][0]]+cnt[id]+getRank(ch[id][1],v);

}

int getVal(int id,int rank) {

if(!id)return INF;

if(rank<=size[ch[id][0]])return getVal(ch[id][0],rank);

else if(rank<=size[ch[id][0]]+cnt[id])return val[id];

else return getVal(ch[id][1],rank-size[ch[id][0]]-cnt[id]);

}

int getPre(int v) {

int id=root,pre;

while(id) {

if(val[id]<v)pre=val[id],id=ch[id][1];

else id=ch[id][0];

}

return pre;

}

int getNext(int v) {

int id = root,next;

while(id) {

if(val[id] > v)next = val[id],id = ch[id][0];

else id = ch[id][1];

}

return next;

}

} trp;

int main() {

trp.build();

int n;

scanf("%d",&n);

while(n--) {

int opt,x;

scanf("%d%d",&opt,&x);

int ans=-INF;

int& r=trp.root;

trp.insert(r,x);

trp.remove(r,x);

ans= trp.getRank(r,x)-1;

ans=trp.getVal(r,x+1);

ans=trp.getPre(x);

ans=trp.getNext(x);

}

}

# 字符串

### 字典树trie

struct Trie{

int ch[M][27];

int val[M];

int sz;

Trie(){sz=1;memset(ch[0],0,sizeof(ch[0]));}

int idx(char c){return c-'a';}

void insert(char s[],int v) {

int u=0,n=strlen(s);

for(int i=0;i<n;i++){

int c=idx(s[i]);

if(!ch[u][c]){

memset(ch[sz],0,sizeof(ch[sz]));

val[sz]=0;

ch[u][c]=sz++;

}

u=ch[u][c];

}

val[u]=v;

}

}tr;

### AC自动机

queue<int> q;

struct ACauto{

int ch[N][26],val[N],fail[N],cnt;

void ins(char\* s){

int len=strlen(s),u=0;

for(int i=0;i<len;i++){

int v=s[i]-'a';

if(!ch[u][v])ch[u][v]=++cnt;

u=ch[u][v];

}

val[u]++;

}

void getFail(){

for(int i=0;i<26;i++){if(ch[0][i]){

fail[ch[0][i]]=0;

q.push(ch[0][i]);

}}

while(!q.empty()){

int u=q.front();q.pop();

for(int i=0;i<26;i++){

if(ch[u][i])fail[ch[u][i]]=ch[fail[u]][i],q.push(ch[u][i]);

else ch[u][i]=ch[fail[u]][i];

}

}

}

int query(char\* s) {

int len=strlen(s);int u=0,ans=0;

for(int i=0;i<len;i++){

u=ch[u][s[i]-'a'];

for(int t=u;t&&~val[t];t=fail[t]){

ans+=val[t],val[t]=-1;

}

}

return ans;

}

}AC;

# 其他

### 输入输出挂

//适用于正负整数

template <class T>

inline bool scan\_d(T &ret) {

char c;

int sgn;

if(c=getchar(),c==EOF) return 0; //EOF

while(c!='-'&&(c<'0'||c>'9')) c=getchar();

sgn=(c=='-')?-1:1;

ret=(c=='-')?0:(c-'0');

while(c=getchar(),c>='0'&&c<='9') ret=ret\*10+(c-'0');

ret\*=sgn;

return 1;

}

inline void out(int x) {

if(x>9) out(x/10);

putchar(x%10+'0');

}