

```

#include<iostream>
#include<cstring>
#include<cstdio>
typedef long long LL;
typedef double D;

using namespace std;

const int L = 50004;

LL S[L], a[L], dp[L], Q[L], n, l;

D slope(int x, int y)
{
    return (D)( (dp[x] + (a[x]+l)*(a[x]+l) - dp[y] - (a[y]+l)*(a[y]+l)) / ((a[x] - a[y]) * 2.0) );
}

int main()
{
    scanf("%lld%lld", &n, &l); l++;
    S[0] = 0;
    for (int s = 1; s <= n; s++)
    {
        scanf("%lld", &S[s]);
        S[s] += S[s-1];
        a[s] = S[s] + s;
    }
    memset(dp, 0, sizeof dp);
    int top = 1, tail = 1;
    memset(Q, 0, sizeof Q);
    for (int s = 1; s <= n; s++)
    {
        while (top < tail && slope(Q[top], Q[top+1]) <= a[s]) top++;
        int x = Q[top];
        dp[s] = dp[x] + (a[s]-a[x]-l)*(a[s]-a[x]-l);

        while (top < tail && slope(Q[tail], s) < slope(Q[tail], Q[tail-1])) tail--;

        Q[++tail] = s;
    }

    printf("%lld\n", dp[n]);
} //斜率优化

```

```

#include<algorithm>
#include<iostream>
#include<cstring>
#include<cstdio>

using namespace std;

const int L = 1000006;

int a[L], ind[L], tmp[L], tag[L], f[L][2], c[L];
int n, tot;

void uniq()
{
    tot = 1, tag[0] = tmp[0];
    int cur = tmp[0];
    for (int s = 1; s < n; s++)
        if (tmp[s] != cur)
            tag[tot++] = tmp[s], cur = tmp[s];
    for (int s = 0; s < n; s++)
    {
        int l = 0, r = tot-1;
        while (l != r)
        {
            int m = (l+r) >> 1;
            if (a[s] <= tag[m]) r = m;
            else l = m+1;
        }
        ind[s] = l+1;
    }
}

int lb(int k)
{
    return k & -k;
}

void update(int k, int num)
{
    for (int s = k; s <= n; s += lb(s)) c[s] = max(c[s], num);
}

int query(int k)
{
    int ret = 0;
    for (int s = k; s; s -= lb(s)) ret = max(ret, c[s]);
    return ret;
}

int main()
{
    scanf("%d", &n);
    for (int s = 0; s < n; s++)
    {
        scanf("%d", &a[s]);
        tmp[s] = a[s];
    }
    sort(tmp, tmp+n);
    uniq();
    /*for (int s = 0; s < n; s++) printf("%d ", ind[s]);
    printf("\n");*/
    memset(c, 0, sizeof c);
    for (int s = 0; s < n; s++)
    {
        f[s][0] = query(ind[s]-1) + 1;
        update(ind[s], f[s][0]);
    }
    memset(c, 0, sizeof c);
    for (int s = n-1; s >= 0; s--)
    {
        f[s][1] = query(ind[s]-1) + 1;
        update(ind[s], f[s][1]);
    }
    int ans = 0;
    for (int s = 0; s < n; s++)
        ans = max(ans, min(f[s][0], f[s][1]));
    printf("%d\n", ans*2 - 1);
} //树状数组 LIS

```

```

typedef long long LL;

using namespace std;

const LL base = 1000000000LL;
const int L = 100005;

int n, m;
LL a[L];

struct node
{
    node *ch[2];
    LL val, rnd, cnt, size;
    node(LL x) {rnd = rand(), size = cnt = 1, ch[0] = ch[1] = NULL; val = x;}
    int cmp(LL x)
    {
        if (x == val) return -1;
        return (x > val ? 1 : 0);
    }
    void maintain()
    {
        size = cnt;
        if (ch[0] != NULL) size += ch[0]->size;
        if (ch[1] != NULL) size += ch[1]->size;
    }
};

void rotate(node* &k, int d)
{
    node *son = k->ch[d^1];
    k->ch[d^1] = son->ch[d];
    son->ch[d] = k;
    k->maintain(), son->maintain();
    k = son;
}

void insert(node* &k, LL x)
{
    if (k == NULL) k = new node(x);
    else
    {
        int d = k->cmp(x);
        if (d == -1) {k->cnt++;}
        else
        {
            insert(k->ch[d], x);
            if (k->ch[d]->rnd < k->rnd) rotate(k, d^1);
        }
        k->maintain();
    }
}

void remove(node* &k, LL x)
{
    //printf("%lld %d %d %d\n", k->val, k->rnd, k->cnt, k->size);
    int d = k->cmp(x);
    if (d != -1) remove(k->ch[d], x);
    else
    {
        if (k->cnt > 1) {k->cnt--;}
        else
        {
            if (k->ch[0] != NULL && k->ch[1] != NULL)
            {
                int dd = (k->ch[0]->rnd < k->ch[1]->rnd ? 1 : 0);
                rotate(k, dd);
                remove(k->ch[dd], x);
            }
            else
            {
                if (k->ch[0] == NULL && k->ch[1] == NULL) k = NULL;
                else if (k->ch[0] == NULL) k = k->ch[1];
                else if (k->ch[1] == NULL) k = k->ch[0];
            }
        }
        if (k != NULL) k->maintain();
    }
}

LL rnk(node *k, LL x)
{
    LL ret = 0;
    while (k != NULL)
    {
        int d = k->cmp(x);
        if (k->ch[1] != NULL && d != 1) ret += k->ch[1]->size;
        if (d == -1) return ret;
        if (d == 0) ret += k->cnt;
        k = k->ch[d];
    }
}

// Treap

```

```

using namespace std;

const int L = 100005;
const int INF = 1 << 30;

int n, m, fa[L][17], dep[L], siz[L], gfa[L], dis[L], vis[L];

struct edge
{
    int u, v, next;
} a[L<<1];

int head[L], tot = 0;

inline int rd() {}

void addedge(int u, int v) {}

void dfs(int x, int stp) {}

void getfa() {}

int LCA(int x, int y) {}

int gcrt = -1, tosize, grasub = 0;

void getroot(int x, int f)
{
    siz[x] = 1;
    int maxsub = 0;
    for (int s = head[x]; ~s; s = a[s].next)
    {
        int v = a[s].v;
        if (vis[v] || v == f) continue;
        getroot(v, x), siz[x] += siz[v];
        maxsub = max(maxsub, siz[v]);
    }
    maxsub = max(maxsub, tosize - siz[x]);
    if (maxsub < grasub) gcrt = x, grasub = maxsub;
}

void build(int x, int f)
{
    vis[x] = 1, gfa[x] = f;
    for (int s = head[x]; ~s; s = a[s].next)
    {
        int v = a[s].v;
        if (vis[v]) continue;
        grasub = tosize = siz[v];
        getroot(v, x);
        build(gcrt, x);
    }
}

int getdist(int x, int y)
{
    int rt = LCA(x, y);
    return dep[x] + dep[y] - (dep[rt] << 1);
}

void update(int x)
{
    int u = x;
    while (~x)
    {
        dis[x] = min(dis[x], getdist(x, u));
        x = gfa[x];
    }
}

int query(int x)
{
    int ans = INF;
    int u = x;
    while (~x)
    {
        int cur = getdist(x, u) + dis[x];
        ans = min(ans, cur);
        x = gfa[x];
    }
    return ans;
}

tosize = n, grasub = n;
getroot(1, -1);
build(gcrt, -1);
update(1);
// 点分树

while (r < q[s].r) r++, add(ind[r]);
while (r > q[s].r) del(ind[r]), r--;
while (l < q[s].l) del(ind[l]), l++;
while (l > q[s].l) l--, add(ind[l]);
// 莫队

```

```

const D eps = 0.0000001;
using namespace std;
const int L = 1005;
const D DINF = 100000000.0;

int vis[L], pre[L], n;
D x[L], y[L], z[L], dis[L];

double hori(int a, int b) { return sqrt( (D)(x[a]-x[b])*(x[a]-x[b]) + (D)(y[a]-y[b])*(y[a]-y[b]) ); }
double vert(int a, int b) { return abs(z[a] - z[b]); }

D prim(D r)
{
    memset(vis, 0, sizeof vis);
    for (int s = 1; s <= n; s++)
    {
        dis[s] = vert(1, s) - r*hori(1, s);
        pre[s] = 1;
    }
    dis[1] = 0, vis[1] = 1;
    D sumh = 0, sumv = 0;
    for (int s = 1; s <= n; s++)
    {
        int v = 0; D minval = DINF;
        for (int t = 1; t <= n; t++)
            if (!vis[t] && dis[t] < minval)
                minval = dis[t], v = t;

        vis[v] = 1;
        sumh += hori(pre[v], v);
        sumv += vert(pre[v], v);
        for (int t = 1; t <= n; t++)
        {
            D nw = vert(v, t) - r*hori(v, t);
            if (!vis[t] && dis[t] > nw)
                dis[t] = nw, pre[t] = v;
        }
    }
    return sumv / sumh;
}

void solve()
{
    D r = 0, nr = DINF;
    while (1)
    {
        nr = prim(r);
        //printf("%.14lf %.14lf\n", r, nr);
        if (abs(nr-r) < eps) break;
        r = nr;
    }
    printf("%.3lf\n", r);
}
// 01 分数规划

void toposort()
{
    queue<int> Q;
    memset(vis, 0, sizeof vis);
    memset(dep, 0, sizeof dep);
    for (int s = 1; s <= n; s++)
        if (!vis[find(s)])
            vis[find(s)] = 1, p[num++] = find(s);
    for (int s = 0; s < num; s++)
        if (!deg[p[s]])
            Q.push(p[s]);
    int pn = 0;
    while (!Q.empty())
    {
        int u = Q.front(); Q.pop();
        deg[u]--; pn++;
        for (int s = head[u]; ~s; s = a[s].next)
        {
            int v = a[s].v;
            deg[v]--;
            dep[v] = max(dep[v], dep[u]+1);
            if (!deg[v]) Q.push(v);
        }
    }
    if (pn != num) { printf("-1\n"); return; }
    int ans = 0;
    for (int s = 0; s < num; s++) ans += (dep[p[s]]+1) * cnt[p[s]];
    printf("%d\n", ans);
}
// 拓扑序

```

```

struct anode
{
    int id; LL len;
    bool operator < (const anode x) const
    {
        return len + dist[id] > x.len + dist[x.id];
    }
};
LL ans = 0;
void BFS(int x)
{
    priority_queue<anode> Q;
    Q.push(anode{x, 0});
    while (!Q.empty())
    {
        anode tmp = Q.top(); Q.pop();
        int u = tmp.id;
        LL len = tmp.len;
        if (u == nd)
        {
            k--;
            if (k == 0)
            {
                ans = len;
                return;
            }
        }
        for (int s = heada[u]; ~s; s = a[s].next)
        {
            int v = a[s].v;
            Q.push(anode{v, len + a[s].w});
        }
    }
}
// k 短路 A*
int dfn[L], low[L], vis[L], tm = 0, dep = 0;
int stk[L], top = 0, all = 0;
void tarjan(int x)
{
    dfn[x] = low[x] = ++dep;
    stk[++top] = x, vis[x] = 1;
    for (int s = head[x]; ~s; s = a[s].next)
    {
        int v = a[s].v;
        if (!dfn[v])
        {
            tarjan(v);
            low[x] = min(low[x], low[v]);
        }
        else if (vis[v]) low[x] = min(low[x], dfn[v]);
    }
    int cur = 0;
    if (low[x] == dfn[x])
    {
        all++;
        while (cur != x)
        {
            cur = stk[top--];
            pre[cur] = all;
            val[all] += w[cur];
            vis[cur] = 0;
        }
    }
}
// Tarjan
void dfs(int x)
{
    stk[++top] = x;
    //printf("# %d\n", x);
    for (int &s = head[x]; ~s; s = a[s].next)
    {
        if (!a[s].vis)
        {
            a[s].vis = 1;
            used++;
            dfs(a[s].v);
            break;
        }
    }
}
void fleury(int x)
{
    stk[++top] = x;
    while (top > 0)
    {
        int flg = 0;
        int u = stk[top];
        //printf("%d\n", u);
        for (int &s = head[u]; ~s; s = a[s].next)
        {
            if (!a[s].vis)
            {
                flg = 1;
                break;
            }
        }
        if (!flg) ans[cnt++] = stk[top--];
        else dfs(stk[top--]);
    }
}
// Fleury 欧拉回路

```

```

int searchP()
{
    queue<int> Q;
    memset(da, -1, sizeof da);
    memset(db, -1, sizeof db);
    dis = INF;
    for (int s = 1; s <= a; s++)
        if (ma[s] == -1)
            Q.push(s), da[s] = 0;
    while (!Q.empty())
    {
        int u = Q.front(); Q.pop();
        if (da[u] > dis) break;
        for (int s = head[u]; ~s; s = e[s].next)
        {
            int v = e[s].v;
            if (~db[v]) continue;
            db[v] = da[u] + 1;
            if (mb[v] == -1) dis = db[v];
            else da[mb[v]] = db[v] + 1, Q.push(mb[v]);
        }
    }
    return dis != INF;
}

int dfs(int u)
{
    for (int s = head[u]; ~s; s = e[s].next)
    {
        int v = e[s].v;
        if (!vis[v] && db[v] == da[u]+1)
        {
            vis[v] = 1;
            if (mb[v] != -1 && db[v] == dis) continue;
            if (mb[v] == -1 || dfs(mb[v]))
            {
                mb[v] = u, ma[u] = v;
                return 1;
            }
        }
    }
    return 0;
}

int match()
{
    int ans = 0;
    memset(ma, -1, sizeof ma);
    memset(mb, -1, sizeof mb);
    while (searchP())
    {
        memset(vis, 0, sizeof vis);
        for (int s = 1; s <= a; s++)
            if (ma[s] == -1 && dfs(s))
                ans++;
    }
    printf("%d\n", ans);
} // 最大匹配

void getConvexHull()
{
    int top = 0;
    for (int s = 0; s < n; s++)
    {
        while (top > 1 && cross(vec(ch[top-2], ch[top-1]), vec(ch[top-1], p[s])) < 0) top--;
        ch[top++] = p[s];
    }
    int cur = top;
    for (int s = n-2; s >= 0; s--)
    {
        while (top > cur && cross(vec(ch[top-1], ch[top-2]), vec(p[s], ch[top-1])) < 0) top--;
        ch[top++] = p[s];
    }
    tot = n > 1 ? top-1 : top;
    ch[tot] = ch[0];
}

void rotatingCalipers()
{
    int ans = 0, top = 2 % tot;
    for (int s = 0; s < tot; s++)
    {
        while (cross(vec(ch[s], ch[top]), vec(ch[s], ch[s+1])) > cross(vec(ch[s], ch[top+1]),
        vec(ch[s], ch[s+1]))) top = (top+1) % tot;
        ans = max(ans, max(distSq(ch[s], ch[top]), distSq(ch[s+1], ch[top])));
    }
    printf("%d\n", ans);
} // 凸包+旋转卡壳

```

```

int bfs()
{
    memset(dep, -1, sizeof dep);
    queue<int> Q;
    dep[0] = 0;
    Q.push(0);
    while (!Q.empty())
    {
        int u = Q.front(); Q.pop();
        for (int s = head[u]; ~s; s = a[s].next)
        {
            int v = a[s].v;
            if (dep[v] == -1 && a[s].w)
            {
                dep[v] = dep[u] + 1;
                Q.push(v);
                if (v == n+m+1) return 1;
            }
        }
    }
    return 0;
}

LL dfs(int x, LL cap)
{
    if (x == n+m+1) return cap;
    for (int &s = work[x]; ~s; s = a[s].next)
    {
        int v = a[s].v;
        if (a[s].w && dep[v] == dep[x] + 1)
        {
            LL tmp = dfs(v, min(a[s].w, cap));
            if (tmp)
            {
                a[s].w -= tmp;
                a[s^1].w += tmp;
                return tmp;
            }
        }
    }
    return 0;
}

LL dinic()
{
    LL ret = 0, add;
    while (bfs())
    {
        for (int s = 0; s <= m+n+1; s++) work[s] = head[s];
        while (add = dfs(0, INF<<1)) ret += add;
    }
    return ret;
} // Dinic+最大权闭合子图

point joint(line e, line f)
{
    D x = (e.B*f.C - f.B*e.C) / (e.A*f.B - f.A*e.B);
    D y = (e.A*f.C - f.A*e.C) / (f.A*e.B - e.A*f.B);
    return point{x, y};
}

point outerCentre(point E, point F, point G)
{
    line H(E, F);
    line I(F, G);
    point M1 = mid(E, F);
    point M2 = mid(F, G);
    line X1(H.B, -H.A, H.A*M1.y - H.B*M1.x);
    line X2(I.B, -I.A, I.A*M2.y - I.B*M2.x);
    point C = joint(X1, X2);
    return C;
}

void minCircleCover()
{
    D curR = 0;
    point CP = p[0];
    for (int s = 1; s < n; s++)
    {
        if (dist(CP, p[s]) <= curR) continue;
        CP = p[s], curR = 0;
        for (int t = 0; t < s; t++)
        {
            if (dist(CP, p[t]) <= curR) continue;
            CP = mid(p[s], p[t]);
            curR = dist(p[s], p[t]) / 2;
            for (int k = 0; k < t; k++)
            {
                if (dist(CP, p[k]) <= curR) continue;
                CP = outerCentre(p[s], p[t], p[k]);
                curR = dist(CP, p[k]);
            }
        }
    }
    printf("%.3lf\n", curR);
    printf("%.3lf %.3lf\n", CP.x, CP.y);
} // 最小圆覆盖--增量法

```



```

void insert(int id)
{
    int len = strlen(tmp), inc = 0;
    for (int s = 0; s < len; s++)
    {
        int u = tmp[s] - 'a';
        if (!tr[inc][u]) tr[inc][u] = tot++;
        inc = tr[inc][u];
    }
    if (!nd[inc]) nd[inc] = id;
    else pre[id] = nd[inc];
}

void getnext()
{
    queue<int> Q;
    f[0] = 0;
    for (int s = 0; s < 26; s++)
    {
        int u = tr[0][s];
        if (u) Q.push(u), lst[u] = 0, f[u] = 0;
    }
    while (!Q.empty())
    {
        int cur = Q.front(); Q.pop();
        for (int s = 0; s < 26; s++)
        {
            int u = tr[cur][s];
            if (!u) tr[cur][s] = tr[f[cur]][s];
            else
            {
                int inc = f[cur];
                while (inc && !tr[inc][s]) inc = f[inc];
                f[u] = tr[inc][s];
                lst[u] = nd[f[u]] ? f[u] : lst[f[u]];
                Q.push(u);
            }
        }
    }
}

void count(int x)
{
    while (x)
    {
        cnt[nd[x]]++;
        x = lst[x];
    }
}

void match()
{
    int len = strlen(ch), inc = 0;
    for (int s = 0; s < len; s++)
    {
        inc = tr[inc][ch[s] - 'a'];
        if (nd[inc]) count(inc);
        else if (lst[inc]) count(lst[inc]);
    }
} // AC 自动机

void getnext()
{
    f[0] = f[1] = 0;
    for (int s = 1; s < lent; s++)
    {
        int inc = f[s];
        while (inc && tem[s] != tem[inc]) inc = f[inc];
        f[s+1] = tem[s] == tem[inc] ? inc+1 : 0;
    }
    //for (int s = 0; s <= lent; s++) printf("%d ", f[s]);
}

void find()
{
    int inc = 0;
    for (int s = 0; s < lench; s++)
    {
        while (inc && ch[s] != tem[inc]) inc = f[inc];
        if (ch[s] == tem[inc]) inc++;
        if (inc == lent) printf("%d ", s-lent+2);
    }
} // KMP

```

```

struct PAM
{
    PAM()
    {
        memset(f, 0, sizeof f);
        memset(ch, 0, sizeof ch);
    }
    int ch[L][26], f[L], len[L], lst, tot;
    LL num[L], cnt[L];
    int find(int s, int x)
    {
        while (S[s-len[x]-1] != S[s]) x = f[x];
        return x;
    }
    void build()
    {
        memset(num, 0, sizeof num);
        f[0] = 1, f[1] = 0;
        len[0] = 0, len[1] = -1;
        tot = 1, lst = 0;
        for (int s = 1; s <= lenS; s++)
        {
            int u = S[s] - 'a';
            int inc = find(s, lst);
            if (!ch[inc][u])
            {
                len[++tot] = len[inc] + 2;
                int pre = find(s, f[inc]);
                f[tot] = ch[pre][u];
                ch[inc][u] = tot;
                num[tot] = num[f[tot]] + 1;
            }
            lst = ch[inc][u];
            cnt[s] = num[lst];
        }
    }
} pam;
LL nex[L], ext[L];
void getnext()
{
    nex[1] = lenT;
    int inc = 1, mr = 2;
    while (inc < lenT && T[inc] == T[inc+1]) inc++;
    nex[2] = inc - 1;
    for (int s = 3; s <= lenT; s++)
    {
        int p = mr + nex[mr] - 1, q = nex[s-mr+1];
        if (q < p-s+1) nex[s] = q;
        else
        {
            inc = max(p-s+1, 0);
            while (s + inc <= lenT && T[s+inc] == T[inc+1]) inc++;
            nex[s] = inc, mr = s;
        }
    }
}
void exkmp()
{
    getnext();
    int mr = 1, mlen = min(lenS, lenT);
    while (mr <= mlen && S[mr] == T[mr]) mr++;
    ext[1] = mr-1, mr = 1;
    for (int s = 2; s <= lenS; s++)
    {
        int p = mr + ext[mr] - 1, q = nex[s-mr+1];
        if (q < p-s+1) ext[s] = q;
        else
        {
            int inc = max(p-s+1, 0);
            while (s + inc <= lenS && inc+1 <= lenT && S[s+inc] == T[inc+1]) inc++;
            ext[s] = inc, mr = s;
        }
    }
}
// PAM+EXKMP
void fill()
{
    int len = strlen(ch);
    int inc = 0;
    tg[inc++] = '['; tg[inc++] = '#';
    for (int s = 0; s < len; s++) tg[inc++] = ch[s], tg[inc++] = '#';
    tg[inc] = '\0';
}
int manacher()
{
    int ans = 0;
    fill();
    int len = strlen(tg);
    int mr = 0, inc = 0;
    for (int s = 1; s <= len; s++)
    {
        if (mr > s) p[s] = min(mr - s, p[inc*2 - s]);
        else p[s] = 1;
        while (tg[s - p[s]] == tg[s + p[s]]) p[s]++;
        if (p[s] + s > mr) mr = p[s] + s, inc = s;
    }
}

```

```

#include<iostream>
#include<cstring>
#include<cstdio>
#include<queue>
typedef long long LL;

using namespace std;

const int L = 1000;

char tmp[L];

int n, ch[L][26], f[L], tot = 1, ll;
LL dp[L][L], val[L];

void insert(int v)
{
    int len = strlen(tmp), inc = 0;
    for (int s = 0; s < len; s++)
    {
        int u = tmp[s] - 'a';
        if (!ch[inc][u]) ch[inc][u] = tot++;
        inc = ch[inc][u];
    }
    val[inc] += v;
}

void getnext()
{
    queue<int> Q;
    f[0] = 0;
    for (int s = 0; s < 26; s++)
    {
        int u = ch[0][s];
        if (u) Q.push(u), f[u] = 0;
    }
    while (!Q.empty())
    {
        int cur = Q.front(); Q.pop();
        val[cur] += val[f[cur]];
        for (int s = 0; s < 26; s++)
        {
            int u = ch[cur][s];
            if (!u) ch[cur][s] = ch[f[cur]][s];
            else
            {
                int inc = f[cur];
                while (inc && !ch[inc][s]) inc = f[inc];
                f[u] = ch[inc][s];
                Q.push(u);
            }
        }
    }
}

void init()
{
    memset(f, 0, sizeof f);
    memset(ch, 0, sizeof ch);
    memset(val, 0, sizeof val);
}

int main()
{
    scanf("%d", &n);
    for (int s = 0; s < n; s++)
    {
        int v;
        scanf("%s%d", tmp, &v);
        insert(v);
    }
    scanf("%d", &ll);
    getnext();
    memset(dp, -1, sizeof dp);
    dp[0][0] = 0;
    LL ans = 0;
    for (int s = 0; s <= ll; s++)
    {
        for (int t = 0; t < tot; t++)
        {
            if (dp[s][t] == -1) continue;
            for (int k = 0; k < 26; k++)
            {
                int u = ch[t][k];
                dp[s+1][u] = max(dp[s+1][u], dp[s][t] + val[u]);
            }
        }
        for (int s = 0; s <= ll; s++)
            for (int t = 0; t < tot; t++)
                ans = max(ans, dp[s][t]);
    }
    printf("%lld\n", ans);
}

// SAM

```