

Standard Code Library

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一切的开始

宏定义

```
1 #include<bits/stdc++.h>
2 using namespace std;
3 typedef long long LL;
4 typedef unsigned u32;
5 typedef unsigned long long u64;
6 typedef long double LD;
7 #define il inline
8 #define pln putchar('\n')
9 #define For(i,a,b) for(int i=(a),(i##i)=(b);i<=(i##i);++i)
10 #define Rep(i,n) for(int i=0,(i##i)=(n);i<(i##i);++i)
11 #define Fodn(i,a,b) for(int i=(a),(i##i)=(b);i>=(i##i);--i)
12 const int M=1000000007,INF=0x3f3f3f3f;
13 const long long INFLL=0x3f3f3f3f3f3f3f3fLL;
14 const int N=1000010;
15 // -----
```

数据结构

ST 表

- 二维

```
1 int f[maxn][maxn][10][10];
2 inline int highbit(int x) { return 31 - __builtin_clz(x); }
3 inline int calc(int x, int y, int xx, int yy, int p, int q) {
4     return max(
5         max(f[x][y][p][q], f[xx - (1 << p) + 1][yy - (1 << q) + 1][p][q]),
6         max(f[xx - (1 << p) + 1][y][p][q], f[x][yy - (1 << q) + 1][p][q])
7     );
8 }
9 void init() {
10     FOR (x, 0, highbit(n) + 1)
11     FOR (y, 0, highbit(m) + 1)
12     FOR (i, 0, n - (1 << x) + 1)
13     FOR (j, 0, m - (1 << y) + 1) {
14         if (!x && !y) { f[i][j][x][y] = a[i][j]; continue; }
15         f[i][j][x][y] = calc(
16             i, j,
17             i + (1 << x) - 1, j + (1 << y) - 1,
18             max(x - 1, 0), max(y - 1, 0)
19         );
20     }
21 }
22 inline int get_max(int x, int y, int xx, int yy) {
23     return calc(x, y, xx, yy, highbit(xx - x + 1), highbit(yy - y + 1));
24 }
```

数学

类欧几里得

- $m = \lfloor \frac{an+b}{c} \rfloor$.
- $f(a, b, c, n) = \sum_{i=0}^n \lfloor \frac{ai+b}{c} \rfloor$: 当 $a \geq c$ or $b \geq c$ 时, $f(a, b, c, n) = (\frac{a}{c})n(n+1)/2 + (\frac{b}{c})(n+1) + f(a \bmod c, b \bmod c, c, n)$; 否则 $f(a, b, c, n) = nm - f(c, c-b-1, a, m-1)$.
- $g(a, b, c, n) = \sum_{i=0}^n i \lfloor \frac{ai+b}{c} \rfloor$: 当 $a \geq c$ or $b \geq c$ 时, $g(a, b, c, n) = (\frac{a}{c})n(n+1)(2n+1)/6 + (\frac{b}{c})n(n+1)/2 + g(a \bmod c, b \bmod c, c, n)$; 否则 $g(a, b, c, n) = \frac{1}{2}(n(n+1)m - f(c, c-b-1, a, m-1) - h(c, c-b-1, a, m-1))$.
- $h(a, b, c, n) = \sum_{i=0}^n \lfloor \frac{ai+b}{c} \rfloor^2$: 当 $a \geq c$ or $b \geq c$ 时, $h(a, b, c, n) = (\frac{a}{c})^2 n(n+1)(2n+1)/6 + (\frac{b}{c})^2 (n+1) + (\frac{a}{c})(\frac{b}{c})n(n+1) + h(a \bmod c, b \bmod c, c, n) + 2(\frac{a}{c})g(a \bmod c, b \bmod c, c, n) + 2(\frac{b}{c})f(a \bmod c, b \bmod c, c, n)$; 否则 $h(a, b, c, n) = nm(m+1) - 2g(c, c-b-1, a, m-1) - 2f(c, c-b-1, a, m-1) - f(a, b, c, n)$.

图论

LCA

- 倍增

```
1 void dfs(int u, int fa) {
2     pa[u][0] = fa; dep[u] = dep[fa] + 1;
3     FOR (i, 1, SP) pa[u][i] = pa[pa[u][i - 1]][i - 1];
4     for (int& v: G[u]) {
5         if (v == fa) continue;
6         dfs(v, u);
7     }
8 }
9
10 int lca(int u, int v) {
11     if (dep[u] < dep[v]) swap(u, v);
12     int t = dep[u] - dep[v];
13     FOR (i, 0, SP) if (t & (1 << i)) u = pa[u][i];
14     FORD (i, SP - 1, -1) {
15         int uu = pa[u][i], vv = pa[v][i];
16         if (uu != vv) { u = uu; v = vv; }
17     }
18     return u == v ? u : pa[u][0];
19 }
```

计算几何

二维几何：点与向量

```
1 #define y1 yy1
2 #define nxt(i) ((i + 1) % s.size())
3 typedef double LD;
4 const LD PI = 3.14159265358979323846;
5 const LD eps = 1E-10;
6 int sgn(LD x) { return fabs(x) < eps ? 0 : (x > 0 ? 1 : -1); }
7 struct L;
8 struct P;
9 typedef P V;
10 struct P {
11     LD x, y;
12     explicit P(LD x = 0, LD y = 0): x(x), y(y) {}
13     explicit P(const L& l);
14 };
15 struct L {
16     P s, t;
17     L() {}
18     L(P s, P t): s(s), t(t) {}
19 };
20
21 P operator + (const P& a, const P& b) { return P(a.x + b.x, a.y + b.y); }
22 P operator - (const P& a, const P& b) { return P(a.x - b.x, a.y - b.y); }
23 P operator * (const P& a, LD k) { return P(a.x * k, a.y * k); }
24 P operator / (const P& a, LD k) { return P(a.x / k, a.y / k); }
25 inline bool operator < (const P& a, const P& b) {
26     return sgn(a.x - b.x) < 0 || (sgn(a.x - b.x) == 0 && sgn(a.y - b.y) < 0);
27 }
28 bool operator == (const P& a, const P& b) { return !sgn(a.x - b.x) && !sgn(a.y - b.y); }
29 P::P(const L& l) { *this = l.t - l.s; }
30 ostream& operator << (ostream& os, const P& p) {
31     return (os << "(" << p.x << ", " << p.y << ")");
32 }
33 istream& operator >> (istream& is, P& p) {
34     return (is >> p.x >> p.y);
35 }
36
37 LD dist(const P& p) { return sqrt(p.x * p.x + p.y * p.y); }
38 LD dot(const V& a, const V& b) { return a.x * b.x + a.y * b.y; }
39 LD det(const V& a, const V& b) { return a.x * b.y - a.y * b.x; }
```

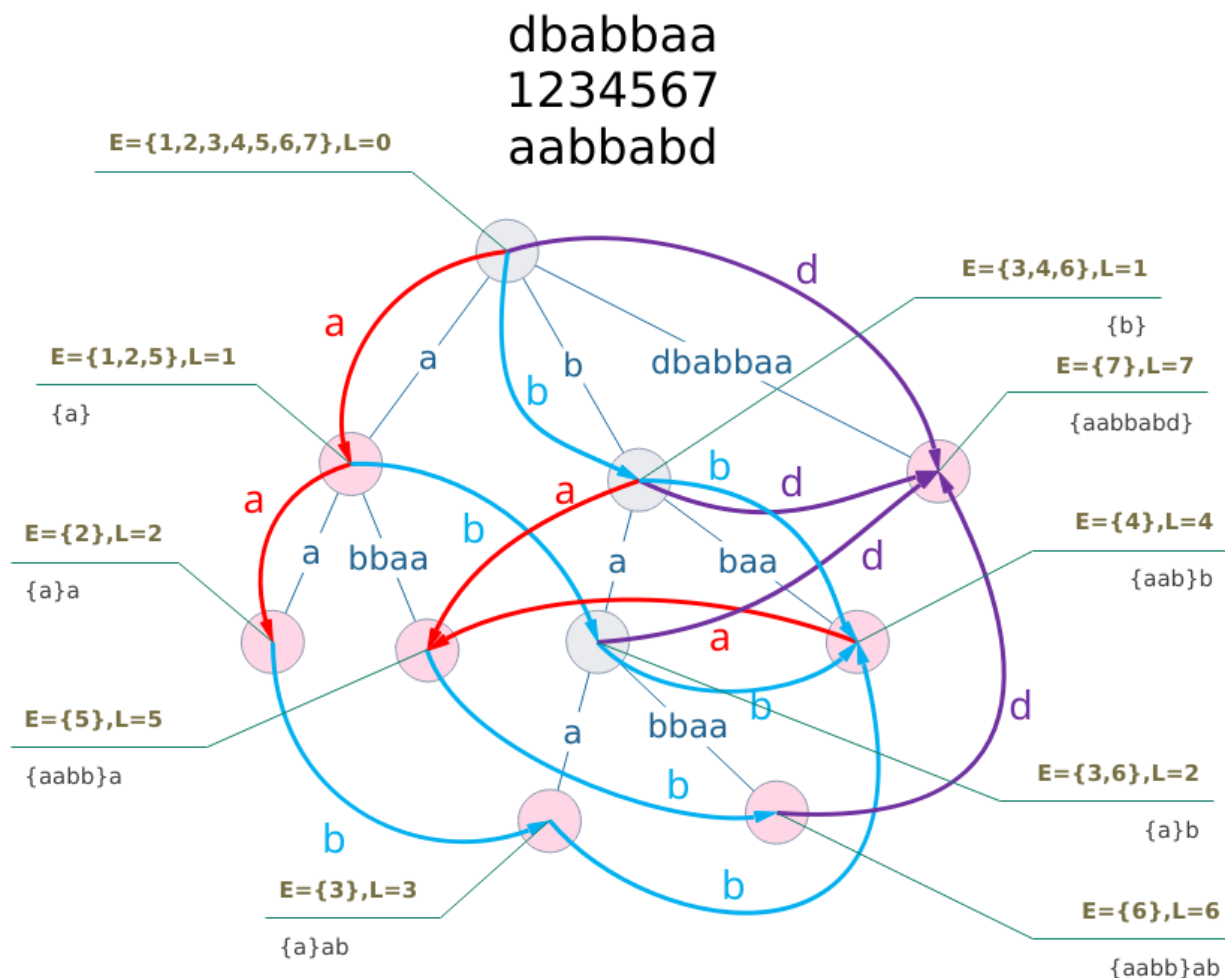
```

40 LD cross(const P& s, const P& t, const P& o = P()) { return det(s - o, t - o); }
41 // -----

```

字符串

后缀自动机



杂项

STL

- copy

```

1 template <class InputIterator, class OutputIterator>
2 OutputIterator copy (InputIterator first, InputIterator last, OutputIterator result);

```