区间dp练习

人员

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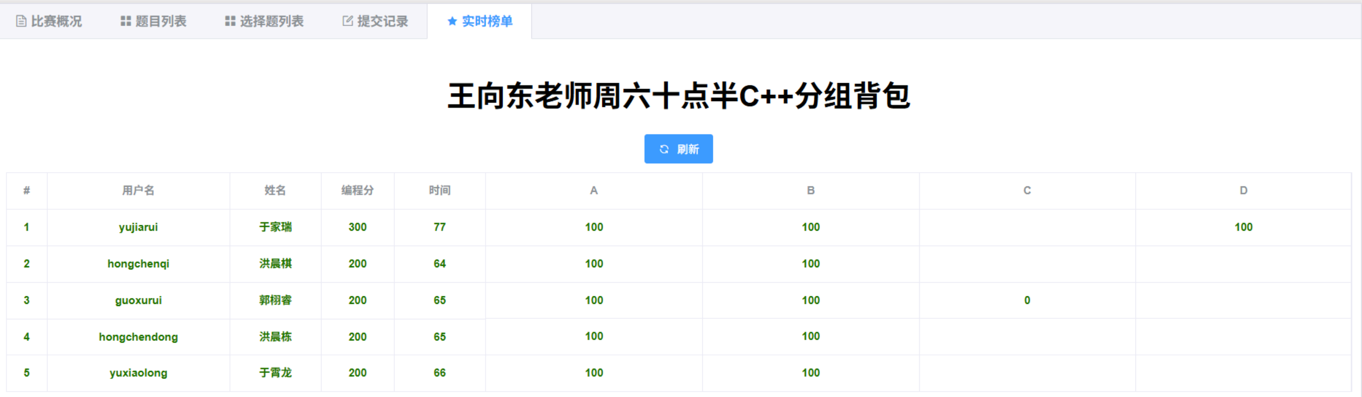
上周作业检查

上周作业链接: https://cppoj.kids123code.com/contest/2680



王向东老师周六十点半C++分组背包

#	用户名	姓名	编程分	时间	A	B	C	D
1	yujiarui	于家瑞	300	77	100	100		100
2	hongchenqi	洪晨棋	200	64	100	100		
3	guoxurui	郭栩睿	200	65	100	100	0	
4	hongchendong	洪晨栋	200	65	100	100		
5	yuxiaolong	于霄龙	200	66	100	100		

本周作业

https://cppoj.kids123code.com/contest/2897 (课上讲了 A ~ D 这些题, 课后作业是 D 题)

课堂表现

今天课上针对区间dp给同学们又进行了一些题目的练习, 同学们课上听课做题表现都比较好。

课堂内容

小书童——刷题大军 (上周作业)

f[i]: 用 i 时间来做作业, 最多能得多少分

找一个得到 r 分所需要的最小时间, 剩下的时间用来刷题

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 150 + 5;
int w[maxn];
int c[maxn], v[maxn];
int f[maxn];

int main()
{
  int n, m, k, r; cin >> n >> m >> k >> r;
  for (int i = 1; i <= n; ++i) cin >> w[i];
  for (int i = 1; i <= m; ++i) cin >> c[i];
  for (int i = 1; i <= m; ++i) cin >> v[i];

  for (int i = 1; i <= m; ++i) {
    for (int j = r; j >= c[i]; --j) f[j] = max(f[j], f[j-c[i]]+v[i]);
  }

  int tm = 0;
  for (int i = 1; i <= r; ++i) {
    if (f[i] >= k) { tm = r-i; break; }
  }

  sort(w+1, w+n+1);
  for (int i = 1; i <= n; ++i) {
    tm -= w[i];
    if (tm < 0) { cout << i-1 << endl; return 0; }
  }
  cout << n << endl;
  return 0;
}
```

[USACO06FEB] Treats for the Cows G/S

f[i][j]: 最后卖 i~j 这一段时, 最多能得到多少钱

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 2000 + 5;
int w[maxn], f[maxn][maxn];

int main()
{
  int n; cin >> n;
  for (int i = 1; i <= n; ++i) cin >> w[i], f[i][i] = w[i]*n;

  for (int len = 2; len <= n; ++len) {
    for (int i = 1; i+len-1 <= n; ++i) {
      int j = i+len-1, day = n-len+1;
      f[i][j] = max(f[i][j-1]+w[j]*day, f[i+1][j]+w[i]*day);
    }
  }

  cout << f[1][n] << endl;
  return 0;
}
```

[USACO16OPEN] 248 G

f[i][j]: i~j 这一段, 最终能变成哪个值

```cpp
#include <bits/stdc++.h>

using namespace std;

const int maxn = 248 + 5;
int w[maxn], f[maxn][maxn];

int main()
{
  memset(f, -1, sizeof(f));
  int n, res = 0; cin >> n;
  for (int i = 1; i <= n; ++i) cin >> w[i], f[i][i] = w[i], res = max(res, w[i]);

  for (int len = 2; len <= n; ++len) {
    for (int i = 1; i+len-1 <= n; ++i) {
      int j = i+len-1;
      for (int k = i; k < j; ++k) {
        if (f[i][k]!=-1 && f[k+1][j]!=-1 && f[i][k]==f[k+1][j])
          f[i][j] = max(f[i][j], f[i][k]+1);
      }
      res = max(res, f[i][j]);
    }
  }

  cout << res << endl;
  return 0;
}
```

[NOIP 2006 提高组] 能量项链

破环成链, 把数组在后面拷贝一遍

f[i][j]: 把 i~j 聚合时, 能释放的最大能量是多少

```cpp
#include <bits/stdc++.h>

using namespace std;

typedef long long LL;
const int maxn = 200 + 5;
const LL inf = 0x3f3f3f3f3f3f3f3f;
LL w[maxn], f[maxn][maxn];

int main()
{
  int n; cin >> n;
  for (int i = 1; i <= n; ++i) cin >> w[i], w[n+i] = w[i];

  for (int i = 1; i <= 2*n-1; ++i) f[i][i+1] = 0;
  for (int len = 3; len <= n+1; ++len) {
    for (int i = 1; i+len-1 <= 2*n; ++i) {
      int j = i+len-1;
      for (int k = i+1; k < j; ++k)
        f[i][j] = max(f[i][j], f[i][k]+f[k][j]+w[i]*w[k]*w[j]);
    }
  }

  LL res = 0;
  for (int i = 1; i <= n; ++i) res = max(res, f[i][i+n]);
  cout << res << endl;
  return 0;
}
```

[CQOI2007] 涂色

f[i][j]: 把 i~j 涂成一个颜色时, 最少用几次

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 50 + 5;
char s[maxn];
int f[maxn][maxn];

int main()
{
  cin >> (s+1);
  int n = strlen(s+1);

  memset(f, 0x3f, sizeof(f));
  for (int i = 1; i <= n; ++i) f[i][i] = 1;
  for (int len = 2; len <= n; ++len) {
    for (int i = 1; i+len-1 <= n; ++i) {
      int j = i+len-1;
      for (int k = i; k < j; ++k) f[i][j] = min(f[i][j], f[i][k]+f[k+1][j]);
      if (s[i] == s[j]) f[i][j] = min({f[i][j], f[i][j-1], f[i+1][j]});
    }
  }
  cout << f[1][n] << endl;
  return 0;
}
```