**实验报告**

**课程名称：算法设计与分析**

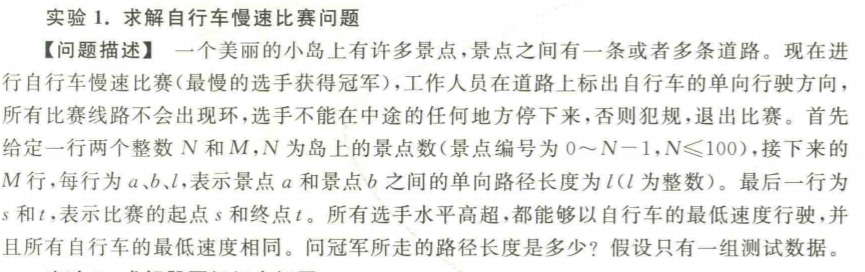
**专业班级：大数据182**

**学号姓名：3180439031陈佳婧**

**实验日期：2020年12月14日**

**第九章上机实验题1： 求解自行车慢速比赛问题**

1. **实验目标和要求：**



**2. 实验环境：（操作系统、语言、编译工具…）WIN10、C++、Clion**

**3. 关键问题及解决思路：**

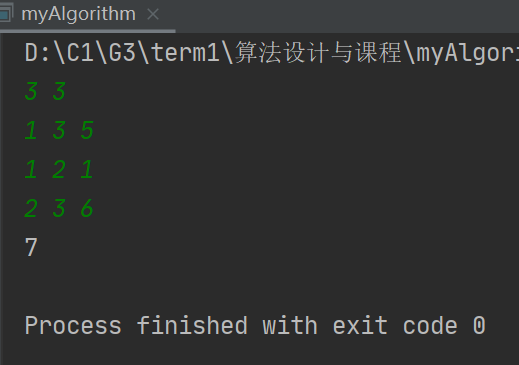
**Bellman-Ford 求最长路。**

**4. 程序流程：**

**5. 完整程序代码：**

#include <iostream>  
  
using namespace std;  
const int N = 200;  
const int INF = 0x3f3f3f3f;  
  
int uv[N][2], dis[200], val[N];  
  
int main() {  
 int n, m;  
 cin >> n >> m;  
 fill(dis, dis + 200, -INF);//因为是求最长路，所以赋值为-INF  
 dis[1] = 0;  
 for (int i = 1; i <= m; i++) {  
 int a, b, c;  
 cin >> a >> b >> c;  
 uv[i][0] = a, uv[i][1] = b, val[i] = c;//记录哪个点到哪个的权值  
 }  
 for (int i = 1; i <= n - 1; i++)  
 for (int j = 1; j <= m; j++)  
 dis[uv[j][1]] = max(dis[uv[j][1]], val[j] + dis[uv[j][0]]);  
 //通过n-1次枚举中间点来更新  
 if (dis[n] != -INF) cout << dis[n] << endl;  
 else cout << -1 << endl;//1到n不连通  
}

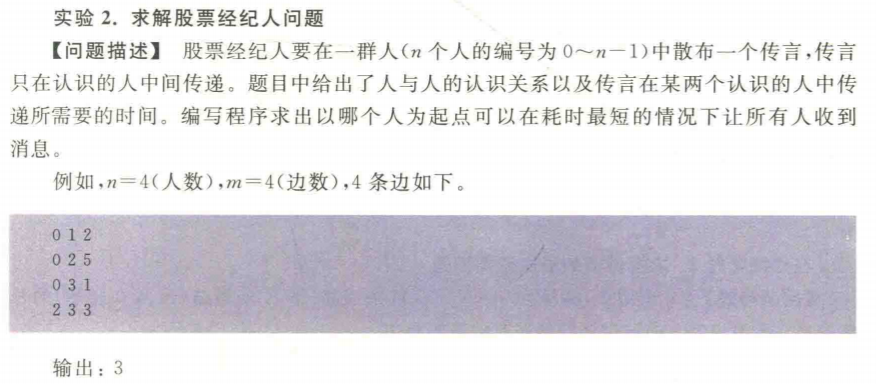
**6. 运行结果展示：**



**7. 实验体会（可选）：**

**第九章上机实验题2： 求解股票经纪人问题**

**1.实验目标和要求：**



**2. 实验环境：（操作系统、语言、编译工具…）WIN10、C++、Clion**

**3. 关键问题及解决思路：**

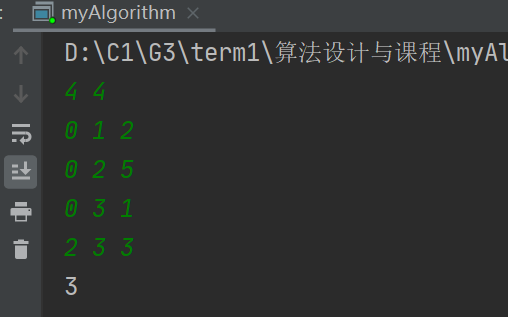
floyd.

**4. 程序流程：**

**5. 完整程序代码：**

#include<iostream>  
#include<cstring>  
#include<algorithm>  
  
const int INF = 0x3f3f3f3f;  
#define mem(a, b) memset(a,b,sizeof(a))  
using namespace std;  
const int maxn = 101;  
int N, M, d[maxn][maxn];  
  
void floyd() {  
 for (int k = 1; k <= N; k++)//经过不大于k点的最短路径  
 for (int v = 1; v <= N; v++)  
 for (int u = 1; u <= N; u++)  
 d[v][u] = min(d[v][u], d[v][k] + d[k][u]);  
}  
  
int main() {  
 while (cin >> N >> M) {  
 mem(d, 0x3f);//初始化  
 for (int v = 1; v <= M; v++) {  
 int c, u, time;;  
 cin >> c >> u >> time;  
 d[c + 1][u + 1] = d[u + 1][c + 1] = time;  
 }  
 for (int i = 1; i <= N; i++) {  
 d[i][i] = 0;//到自身为0  
 }  
 floyd();  
 //求出以各点为源点的最大用时的最小值  
 int minTime = INF, start = 0;  
 for (int i = 1; i <= N; i++) {  
 int sum = 0;  
 for (int j = 1; j <= N; j++)  
 sum = max(sum, d[i][j]);//i传播信息给其他人的最长时间  
 if (minTime > sum) {  
 minTime = sum;  
 start = i;  
 }  
 }  
 if (start == 0) printf("disjoint\n");  
 else printf("%d\n", start-1);  
 }  
 return 0;  
}

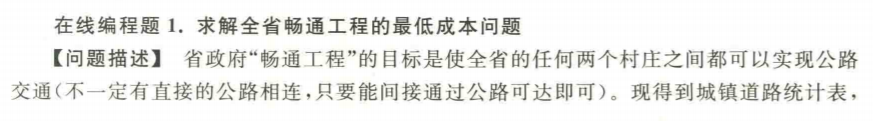
**6. 运行结果展示：**

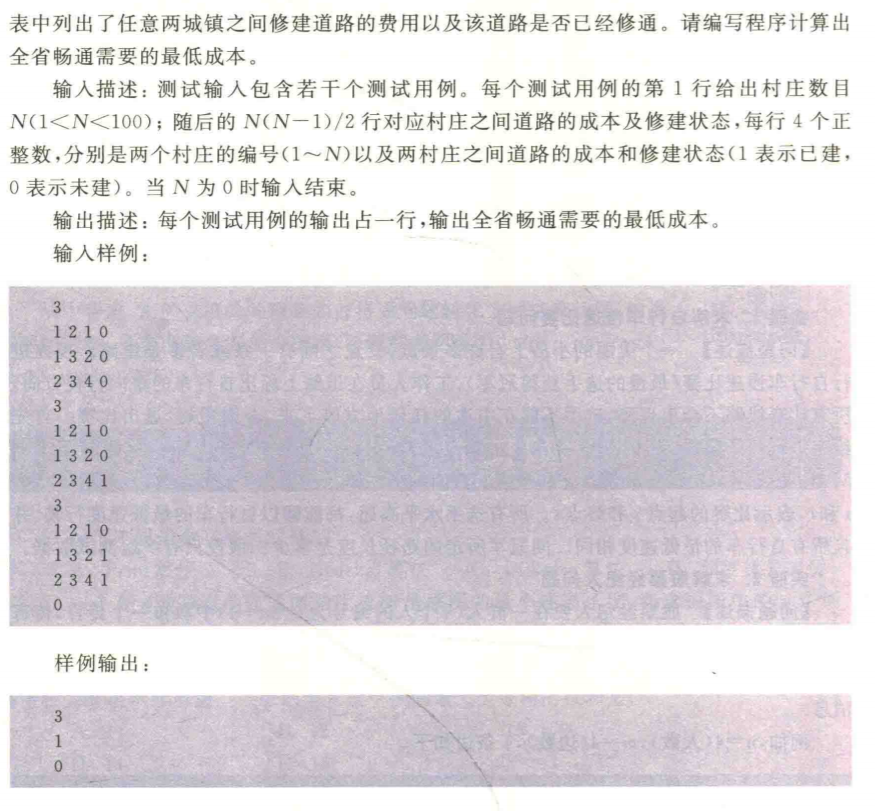


**7. 实验体会（可选）：**

**第八章在线编程题1： 求解全省畅通工程的最低成本问题**

**1.实验目标和要求：**





**2. 实验环境：（操作系统、语言、编译工具…）WIN10、C++、Clion**

**3. 关键问题及解决思路：**

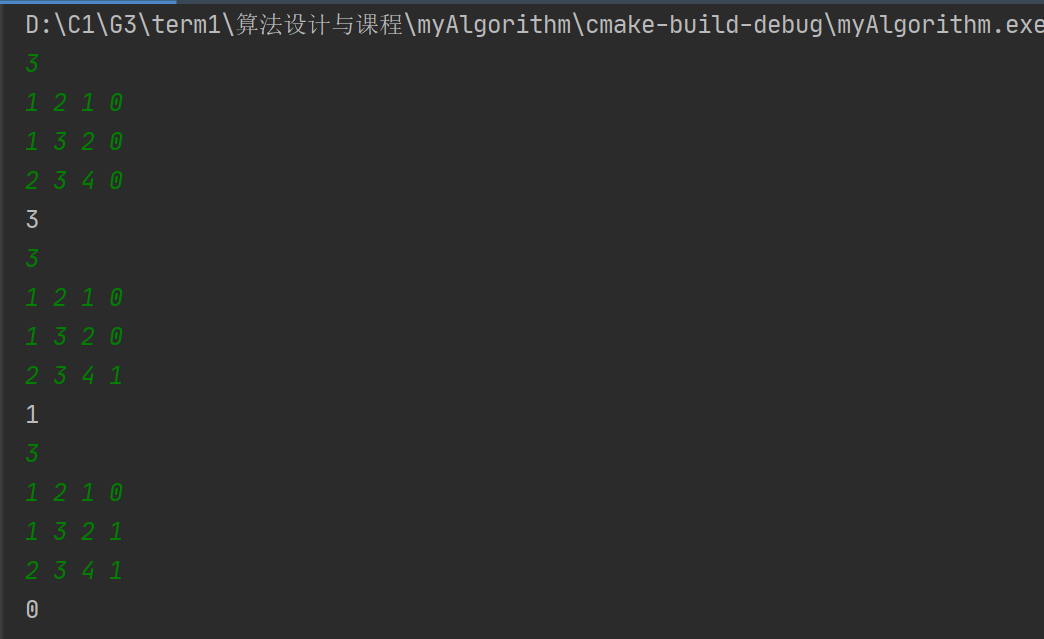
**最小生成树，Prim**

**4. 程序流程：**

**5. 完整程序代码：**

#include<bits/stdc++.h>  
  
const int MAX = 0x3f3f3f;  
using namespace std;  
  
int Map[105][105];  
int dis[105];  
int vis[105];  
  
int Prim(int n) {  
 int i, j, t;  
 int sum = 0;  
 vis[0] = 1;  
 for (i = 1; i <= n; i++) {  
 for (j = 1; j <= n; j++) {  
 dis[i] = Map[i][j];  
 }  
 }  
 for (i = 1; i <= n; i++) {  
 t = i;  
 int MIN = MAX;  
 for (j = 1; j <= n; j++) {  
 if (MIN > dis[j] && !vis[j]) {  
 MIN = dis[j];  
 t = j;  
 }  
  
 }  
 sum = sum + MIN;  
 vis[t] = 1;  
 for (j = 1; j <= n; j++) {  
 if (Map[t][j] < dis[j] && !vis[j]) {  
 dis[j] = Map[t][j];  
 }  
 }  
 }  
 return sum;  
}  
  
int main() {  
 int n;  
 int i, j;  
 int a, b, c,d;  
 while (cin >> n && n != 0) {  
 memset(vis, 0, sizeof(vis));  
 for (i = 1; i <= n; i++) {  
 for (j = 1; j <= n; j++) {  
 if (i == j)  
 Map[i][j] = 0;  
 else  
 Map[i][j] = MAX;  
 }  
 }  
 for (i = 1; i <= n \* (n - 1) / 2; i++) {  
 cin >> a >> b >> c>>d;  
 if(d==1)Map[a][b] = Map[b][a] = 0;  
 else{  
 if (Map[a][b] > c) {  
 Map[a][b] = Map[b][a] = c;  
 }  
 }  
 }  
 int ans = Prim(n);  
 cout << ans << endl;  
 }  
 return 0;  
}

**6. 运行结果展示：**



**7. 实验体会（可选）：**