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|  |  |
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参考文献

牛顿冷却定律的冷却规律研究—刘志华 一维热传导方程的推导贾海峰

源代码

问题一(文件名：1.CPP)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<iostream> using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5;

Id v,d;

Id A,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x)); if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)retum T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5); return 25;

)

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001][2]; inline void cp()

intj;

double t,CNT=0; int i=0;

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

( if(abs(STD[i][0]-timO])<1e-6) {

CNT+=pow(1-THJ[MXI]Q]/STD[i][1],2); i++； if(CNT>MINL) return;

}

}

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

( if(abs(STD[i][0]-tim[j])<1e-6) {

TH[i]=THJ[MXI]Q];

i++；

)

)

MINL=CNT;

MINA=A;

MINB=B;

}

inline void print()

(

freopen("s.out","w",stdout);

intj;

Id t,CNT=0; /\*for(j=0,t=0;t\*v<=500;t+=dt,j++) if(TGD(t\*v)>250)( for(int ii=O;ii<=MXI;ii++) printf("%6.2Lf puts—);}\*/

printf("%Lf %Lf %Lf\n",MINA,MINB,MINL); printf("%d\n",MXI);

int i=0; /\*for(j=0,t=0;t\*w=500;t+=dt,j++,puts("")) for(i=0;i<=MXI;i++) printf("%6.2Lf\t",THJ[i][j]);

\*/

/\*for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

if(t>=290.97&&t<=300)

( printf("%Lf %Lf\n",t,tim[j]);

for(int ii=O;ii<=MXI;ii++)

printf("%6.7Lf\t",THJ[ii][j]); puts("");

// printf("%.2Lf %.2Lf\n",tim[j],THJ[MXI][j]);

//i++;

)

}\*/

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

printf("%.2Lf\n",TH[i]);

int main()

(

T1 =173,T2=198,T3=230,T4=257,T5=25； v=7.8/6;

//d=0.015/2;

Id IIB;

d=0.015/2;

//dt=0.01,dx=d/100;

//dt=0.005,dx=d/100;

dt=0.001,dx=0.015/2/100;

//dt=0.001,dx=10;

freopen("s.in","r",stdin);

double a,b;

while(scanf("%lf%lf',&a,&b)==2)

(

STD[++N][0]=a;

STD[N][1]=b;

}

MINL=1e100;

A=6.4;// (6.4e-4 - 9.2e-4)

B=100;//(0.2-1)

// for(A=0.00005;A<=0.0002;A=A+0.00005)

// for(B=10；B<=50；B=B+10)

// for(A=0.09224;A>=0.06417;A=A-0.00001)

//for(B=-10;B>=-200;B=B-1)

//t=0.0001

A=0.000010, B=54.600000；// 0=478591.910061 Id ttp=40;

//for(x0=0;x0<=20;x0=x0+1) //for(A=0.00010;A<=0.00060;A+=0.00002)

// for(B=120;B<=300;B+=15) //test

//A=0.001,B=5；

A=0.0002;

B=68;

bool rt;

//for(A=0.0001 ;A<=0.00052;A+=0.0001)

// fo「(B=66;B<=73;B+=2)

//for(xO=1 ;x0<=24;x0+=2) xO=O;

Id Bt=1;

//for(xO=1 ;x0<25;x0+=2)

//for(A=0.0001 ;A<=0.001 ;A+=0.0002)

// for(IIB=10;IIB<=100;IIB+=10)

// for(Bt=0.1;Bt<=1;Bt+=0.2)

Bt=0.3,x0=7,A=0.0003,l 旧=70;

(

tp=5.0/ttp；

B=IIB;

rt=1；

Id xx,t;

Id CNT=0,MAX,Ld,Hd;

int i,j； for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25;

THJ[2][0]=25；

THJ[2][1]=25；

intni=1;

MXI=-1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

/\*THJ[1]0+1]=TGD(t\*v);

THJ[1][1]=25；

THJ[2]0+1]=THJ[1][j+1]+dx\*B\*(THJ[1]0+1]-TGD((t+1)\*v));

THJ[2][j+1]=max(min(THJ[2]U],THJ[1][j+1]))THJ[2][j+1]);

THJ[2][j+1]=min(max(THJ[2][j],THJ[1][j+1]),THJ[2][j+1]);\*/

//TH J[2]D+1 ]=TH J[1 ][j]+B\*dx\*(TH J[1 ]D]-TGD(t\*v));

THJ[1]0+1]=THJ[2]0]+B\*dx\*(TGD(t\*v)-THJ[1][j]); //printf(,,%.1OLf\n,,,B\*dx\*(TGD(t\*v)-THJ[1]0]))； tim[j]=t;

if(rt&&THJ[1]0+1]<THJ[1]Q]) //if(rt&&THJ[MXI]0+1]<THJ[MXI][j])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

*I\** if(j)

THJ[i+1][j+1]=dx\*dx/2/dVA\*(THJ[i]0+1]-THJ[i]0- 1])+2\*THJ[i]0+1]-THJ[i-1]0+1]；

else THJ[i+1]0+1]=dx\*dx/dt/A\*(THJ[i]g+1]-THJ[i]0])+2\*THJ[i]0+1]- THJ[i-1][j+1];

THJ[i+1][j+1]=max(min(THJ[i+1][j],THJ[i][j+1]))THJ[i+1]D+1]);

THJ[i+1][j+1]=min(max(THJ[i+1][j],THJ[i][j+1]),THJ[i+1][j+1]);\*/ if(j)

//THJ[i+1]0+1]=(-(dx\*dx/dt/A\*(THJ[i][j]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

THJ[i+1][j+1]=(-(dx\*dx/dt/2/A\*(THJ[i]0+1]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1J0+1]=25;

/\*if(i>1) if(THJ[i+1][j+1]-1e-6>THJ[i]0+1]&&THJ[i-1]0+1]-1e- 6>THJ[i]0+1])

printf("Case 1:i:%d j:%d dx:%LF dt:%Lf - (dx\*dx/dt/2/A\*(THJ[i]0+1]-THJ[i]0-1])：%Lf THJ[i]Q+1]:%Lf THJ[i-1][j+1]:%Lf THJ[i+1][j+1]:%Lf\n",i,j,

dx,dt, -(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i][j-

1]))/2,THJ[i][j+1],THJ[i-1][j+1LTHJ[i+1][j+1]),exit(0);

else if(THJ[i+1][j+1]<THJ[i]0+1]-1e-6&&THJ[i][j+1]>THJ[i- 1]U+1]+1e-6)

printf("Case 2:i:%d j:%d dx:%LF dt:%Lf -

(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0-1])：%Lf THJ[i][j+1]:%Lf THJ[i-1][j+1]:%Lf

THJ[i+1][j+1]:%Lf\n",i,j,

dx,dt, -(dx\*dx/dt/2/A\*(THJ[i]D+1]-THJ[i][j-

1]))/2,THJ[i][j+1],THJ[i-1][j+1],THJ[i+1][j+1]),exit(0);

\*/

MXI=max(MXI,i+2);

)

if(abs(STD[ni][0]-timO])<1 e-6)

(

if(ni<=N)

CNT+=pow(THJ[MXI][j]-STD[ni][1],2);

ni++;

if(CNT>2\*MINL)

(

printf("Bt:%Lf\txO:%Lf\tA:%Lf\tB:%Lf\t\n",Bt>xO)A,IIB);

puts("Over");

goto L;

}

)

THJ[MXI]0+1]=THJ[MXI-1]0+1]；

if(abs(t\*v-111.25)<5e-4)

printf("mid 3 %Lf\n",THJ[MXI][j]);

if(abs(t\*v-217.75)<5e-4)

printf("mid 6 %Lf\n",THJ[MXI][j]);

if(abs(t\*v-253.25)<5e-4)

printf("mid 7 %Lf\n",THJ[MXI][j]);

if(abs(t\*v-304)<5e-4)

printf("end 8 %Lf\n",THJ[MXI][j]);

)

MAX=-1,Ld=-1;

ni=1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

if(j%500==0)

TH[ni]=THJ[MXI][j];

MAX=max(MAX,TH[ni]);

N=ni++;

MINL=CNT;

MINA=A; MINB=B; L:B=B\*Bt；

}

print();

return 0;

)

问题一(文件名：参数遍历.cpp,说明：参数遍历)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5;

Id v,d;

Id A,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0); //if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x)); if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5); if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5); return 25;

)

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001 ][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(abs(STD[i][0]-timO])<1e-6)

{

CNT+=pow(1-THJ[MXI]Q]/STD[i][1],2);

i++；

if(CNT>MINL)

return;

}

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

( if(abs(STD[i][0]-timO])<1e-6) {

TH[i]=THJ[MXI]Q];

i++；

)

)

MINL=CNT;

MINA=A;

MINB=B;

}

inline void print()

(

freopen("s.out","w",stdout);

intj;

Id t,CNT=0; /\*for(j=0,t=0;t\*v<=500;t+=dt,j++) if(TGD(t\*v)>250)(

for(int ii=0;ii<=MXI;ii++) printf("%6.2Lf",THJ[ii][j]);

puts—);}\*/

printf("%Lf %Lf %Lf\n",MINA,MINB,MINL); printf("%d\n",MXI);

int i=0; /\*for(j=0,t=0;t\*w=500;t+=dt,j++,puts("")) for(i=0;i<=MXI;i++)

printf("%6.2Lf\t",THJ[i][j]);

\*/

/\*for(j=0,t=0;t\*w=500&&iv=N;t+=dt,j++)

(

if(t>=290.97&&t<=300)

(

printf("%Lf %Lf\n",t,tim[j]);

for(int ii=O;ii<=MXI;ii++)

printf("%6.7Lf\t",THJ[ii][j]);

puts("");

// printf("%.2Lf %.2Lf\n",tim[j],THJ[MXI][j]);

//i++;

)

}\*/

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

printf("%.2Lf\n,,,TH[i]);

int main()

(

T1 =175,T2=195,T3=235,T4=255,T5=25； v=7./6；

//d=0.015/2;

Id IIB;

d=0.015/2;

//dt=0.01,dx=d/100;

//dt=0.005,dx=d/100;

dt=0.001,dx=0.015/2/100;

//dt=0.001,dx=10;

freopen("s.in","r",stdin);

freopen("参数遍历原始数据.out","w",stdout); double a,b;

while(scanf("%lf%lf',&a,&b)==2)

STD[++N][O]=a;

STD[N][1]=b;

MINL=1e100;

A=6.4;// (6.4e-4 - 9.2e-4)

B=100；//(0.2-1)

// for(A=0.00005;A<=0.0002;A=A+0.00005)

// for(B=10;B<=50;B=B+10)

// for(A=0.09224;A>=0.06417;A=A-0.00001)

//for(B=-10;B>=-200;B=B-1)

//t=0.0001

A=0.000010, B=54.600000；// 0=478591.910061

Id ttp=40;

//for(x0=0;x0<=20;x0=x0+1)

//for(A=0.00010;A<=0.00060;A+=0.00002)

// for(B=120;B<=300;B+=15)

//test

//A=0.001,B=5；

A=0.0002;

B=68;

bool rt;

//for(A=0.0001 ;A<=0.00052;A+=0.0001)

// fo「(B=66;B<=73;B+=2)

//for(xO=1 ;x0<=24;x0+=2)

xO=O;

Id Bt=1;

for(xO=1 ;x0<25;x0+=2) for(A=0.0001 ;A<=0.001 ;A+=0.0002)

for(IIB=10;IIB<=100;IIB+=10)

for(Bt=0.1 ;Bt<=1 ;Bt+=0.2)

{

tp=5.0/ttp；

B=IIB;

rt=1；

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j；

fo「(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

intni=1;

MXI=-1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) fo「(j=0,t=0;t\*v<=500;t+=dt,j++)

(

/\*THJ[1J0+1]=TGD(t\*v);

THJ[1][1]=25；

THJ[2]D+1]=THJ[1]D+1]+dx\*B\*(THJ[1]D+1]-TGD((t+1)\*v));

THJ[2][j+1]=max(min(THJ[2][j],THJ[1][j+1]),THJ[2][j+1]);

THJ[2][j+1]=min(max(THJ[2]U],THJ[1][j+1]))THJ[2][j+1]);\*/ //TH J[2]Q+1 ]=TH J[1 ]OJ+B\*dx\*(TH J[1 ]D]-TGD(t\*v));

THJ[1][j+1]=THJ[2][j]+B\*dx\*(TGD(t\*v)-THJ[1]0])； //printf(,,%.10Lf\n,,,B\*dx\*(TGD(t\*v)-THJ[1][j])); tim[j]=t;

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

/\* if(j)

THJ[i+1][j+1]=dx\*dx/2/dt/A\*(THJ[i][j+1]-THJ[i]0- 1])+2\*THJ[i]0+1]-THJ[i-1][j+1];

else THJ[i+1][j+1]=dx\*dx/dVA\*(THJ[i]0+1]-THJ[i][j])+2\*THJ[i]0+1]- THJ[i-1][j+1];

THJ[i+1][j+1]=max(min(THJ[i+1][j],THJ[i][j+1]),THJ[i+1]g+1]);

THJ[i+1]g+1]=min(max(THJ[i+1]0],THJ[i]D+1])>THJ[i+1][j+1]);\*/ if(j)

//THJ[i+1]0+1]=(-(dx\*dx/dt/A\*(THJ[i]Q]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

THJ[i+1]Q+1]=(-(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1][j+1]=25;

/\*if(i>1) if(THJ[i+1][j+1]-1e-6>THJ[i][j+1]&&THJ[i-1][j+1]-1e- 6>THJ[i][j+1])

printf("Case 1:i:%d j:%d dx:%LF dt:%Lf

(dx\*dx/dt/2/A\*(THJ[i]0+1]-THJ[i][j-1]):%Lf THJ[i][j+1]:%Lf THJ[i-1][j+1]:%Lf THJ[i+1][j+1]:%Lf\n",i,j,

dx.dt, -(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i][j-

1]))/2,THJ[i][j+1],THJ[i-1][j+1],THJ[i+1][j+1]),exit(0);

else if(THJ[i+1][j+1]<THJ[i]0+1]-1e-6&&THJ[i]g+1]>THJ[i- 1]D+1]+1e-6)

printf("Case 2:i:%d j:%d dx:%LF dt:%Lf - (dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]D-1]):%Lf THJ[i][j+1]:%Lf THJ[i-1][j+1]:%Lf THJ[i+1][j+1]:%Lf\n,,)i)jI

dx.dt, -(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i][j-

1]))/2,THJ[i][j+1],THJ[i-1][j+1],THJ[i+1][j+1]),exit(0);

\*/

MXI=max(MXI,i+2);

)

if(abs(STD[ni][0]-timQ])<1 e-6)

{

if(ni<=N)

CNT+=pow(THJ[MXI]0]-STD[ni][1],2);

ni++;

if(CNT>2\*MINL)

(

printf("Bt:%Lf\txO:%Lf\tA:%Lf\tB:%Lf\t\n",Bt,xO,A,IIB); puts("Over");

goto L;

)

)

THJ[MXI][j+1]=THJ[MXI-1][j+1];

)

MAX=-1,Ld=-1;

ni=1;

for(j=0,t=0;t\*v<=500&&ni<=N;t+=dt,j++)

(

if(abs(STD[ni][0]-tim[j])<1 e-4)

{

TH[ni]=THJ[MXI][j];

MAX=max(MAX,TH[ni]);

if(Ld==-1)

Ld=TH[ni];

if(ni==N)

Hd=TH[ni];

ni++;

MINL=CNT;

MINA=A;

MINB=B;

printf("Bt:%Lf\txO:%Lf\tA:%Lf\tB:%Lf\t%Lf\t%Lf\t%Lf\t%Lf\n",Bt,xO,A,IIB,sqr t(CNT/N),Ld,MAX,Hd);

L:B=B\*Bt；

)

Print();

return 0;

}

问题一(文件名：sensitivity.cpp,说明：参数敏感性分析)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<queue> #include<iostream> using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5;

Id v,d;

Id A.B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x));

if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5);

return 25;

struct Pa

Id T1,T2,T3,T4,v;

IdM;

inline bool friend operator < (Pa a,Pa b)(return a.M>b.M;}

Pa(){}；

Pa(ld t1,ld t2,ld t3,ld t4,ld vv.ld

MM):T1(t1),T2(t2),T3(t3),T4(t4),v(vv),M(MM)()

void

print()(printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",T1,T2,T3,T4,v\*60,M

)；)

}；

priority\_queue<Pa>Q;

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(abs(STD[i][0]-timO])<1e-6)

{

CNT+=pow(1-THJ[MXI][j]/STD[i][1],2);

i++；

if(CNT>MINL)

return;

)

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

(

if(abs(STD[i][0]-tim[j])<1e-6)

TH[i]=THJ[MXI]OJ；

i++；

)

MINL=CNT;

MINA=A;

MINB=B;

Id IIB;

Id ttp=40;

Id Bt;

Id S[21][21][21][21][41];

int Out[21][21][21][21][41];

Id solve()

(

//d=0.015/2;

d=0.015/2;

dt=O.OO1,dx=O.O15/2/100;

int t1,t2,t3,t4;

t1=int(T1+1e-1)-165;

t2=int(T2+1e-1)-185;

t3=int(T3+1e-1 )-225;

t4=int(T4+1e-1 )-245;

//printf("%d %d %d %d\n",t1,t2,t3,t4); int vv=int(v\*60+1e-1 )-65;

//printf("%d\n",vv); if(t1>20||t2>20||t3>20||t4>20||vv>35)return 1e100;

//if(S[t1][t2][t3][t4][vv]>1e-1)

// return S[t1][t2][t3][t4][vv];

MINL=1e100;

bool rt;

Id MINS=1e100;

tp=5.0/ttp;

rt=1；

Id Area=0;

Id xx,t;

Id CNT=0,MAX,Ld,Hd;

int i,j; fo「(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

MXI=-1;

bool UP=false;

double ST=1e100,ED=-1;

double ST2=1e100,ED2=-1; //for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++) (

THJ[1J0+1]=THJ[2][j]+B\*dx\*(TGD(t\*v)-THJ[1]0])； tim[j]=t; if(rt&&THJ[1][j+1]<THJ[1]g])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

if(j)

THJ[i+1]Q+1]=(-(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0- 1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1][j+1]=25;

MXI=max(MXI,i+2);

)

THJ[MXI][j+1]=THJ[MXI-1][j+1];

if(abs(THJ[MXI][j+1]-THJ[MXI]0])/dt>3) (

//puts("175H);

goto pl；｝

if(TH J[MXI][j+1 ]>150&&ST>1 e10)

ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

(

ED=t；

if(ED-ST<60||ED-ST>120)

//puts("182");

goto pl；｝

)

if(THJ[MXI][j+1]>240)

UP=true;

if(THJ[MXI][j+1]>217)

(

Area+=(THJ[MXI][j+1]-217)\*dt;

if(Area>MINS)

(

//puts("191");

goto pl；｝ if(Area+pow(THJ[MXI]0+1]-217,2)/6>MINS) (//puts("193");

goto pl；｝ if((!UP)&&Area+(24O-THJ[MXI]0+1])\*(THJ[MXI][j+1]- 194)/6+(23\*23)/6 >MINS)

(

//puts("195"); goto pl；｝

)

if(THJ[MXI][j+1]>250)

(//puts("199");

goto pl；｝

if(TH J[MXI][j+1 ]>217&&ST2> 1 e10)

ST2=t;

if(THJ[MXI][i+1 ]<217&&ST2<1e10)

(

ED2=t；

if(ED2-ST2<40&&ED2-ST2>90) (//puts("207");

goto pl；｝

)

MAX=-1,Ld=-1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

MAX=max(MAX,THJ[MXI][j]);

if(MAX<240)

//printf("%Lf\n",MAX);

for(int vi=vv;vi<=20;vi++)

S[t1][t2][t3][t4][vi]=1e100;

//puts("225n);

goto pl；

}

if(MAX>250)

(//puts("228");

for(int vi=vv;~vi;vi--)

S[t1][t2][t3][t4][vi]=1e100;

goto pl;}

MINL=CNT;

MINA=A;

MINB=B;

L:B=B\*Bt；

MINS=Area;

goto ed;

pl:Area=1e100;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\tNo\n",T1,T2,T3,T4,v\*60);

ed:;

//printf("%Lf\nH,Area);

//print();

if(Area<1e10)

Q.push(Pa(T1 ,T2,T3,T4,v,Area));

return S[t1 ][t2][t3][t4][vv]=Area;

} int main()

(

ldM=1e100,tp;

Bt=0.3,x0=7,A=0.0003,IIB=70；

freopen("sensitivity1.out","w",stdout); freopen("s.in","r",stdin);

double a,b;

int N=0;

while(scanf(,,%lf%lf',&a,&b)==2)

STD[++N][O]=a;

STD[N][1]=b;

}

for(Bt=0.1 ;Bt<=0.5;Bt+=0.05)

(

Pa L;

T1=175,T2=195,T3=235,T4=255,T5=25,v=70./60,M=solve(); intj;

Id t;

int i=1;

Id CNT=O; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) if(j%500==0)

(

if(j>=19000)

CNT+=pow(THJ[MXI][j]-STD[i++][1],2);

)

CNT/=N;

printf("%Lf\t%Lf\n",Bt,sqrt(CNT));

}

M=1e100;

Bt=0.3,x0=7,A=0.0003,l 旧=70;

freopen("sensitivity2.out,,,"w",stdout);

freopen("s.in","r",stdin);

N=0;

while(scanf(,,%lf%lf',&a,&b)==2)

(

STD[++N][0]=a;

STD[N][1]=b;

}

for(x0=5;x0<=9;x0+=0.5)

(

Pa L;

T1=175,T2=195,T3=235,T4=255,T5=25,v=70./60,M=solve(); intj;

Id t;

int i=1;

Id CNT=0;

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) if(j%500==0)

if(j>=19000)

CNT+=pow(THJ[MXI][j]-STD[i++][1],2);

)

CNT/=N; printf("%Lf\t%Lf\n",xO,sqrt(CNT));

)

M=1e100;

Bt=0.3,x0=7,A=0.0003,l 旧=70;

freopen("sensitivity3.out","w",stdout); freopen("s.in","r",stdin);

N=0;

while(scanf("%lf%lf',&a,&b)==2)

(

STD[++N][0]=a;

STD[N][1]=b;

) for(A=0.0001；A<=0.0005；A+=0.00005)

(

Pa L;

T1=175,T2=195,T3=235,T4=255,T5=25,v=70./60,M=solve(); intj;

Id t;

int i=1;

Id CNT=0;

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) if(j%500==0)

(

if(j>=19000) CNT+=pow(THJ[MXI][j]-STD[i++][1],2);

}

CNT/=N; printf("%Lf\t%Lf\n",A,sqrt(CNT));

)

M=1e100;

Bt=0.3,x0=7,A=0.0003,l 旧=70; freopen("sensitivity4.out","w",stdout); freopen("s.in","r",stdin);

N=0; while(scanf("%lf%lf,)&a,&b)==2)

(

STD[++N][0]=a;

STD[N][1]=b;

}

for(l 旧=60;IIB <=80;IIB+=2.5)

Pa L;

T1=175,T2=195,T3=235,T4=255,T5=25,v=70./60,M=solve(); intj;

Id t;

int i=1;

Id CNT=O; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) if(j%500==0)

(

if(j>=19000) CNT+=pow(THJ[MXI][j]-STD[i++][1],2);

**}**

CNT/=N; printf("%Lf\t%Lf\n",IIB,sqrt(CNT));

**}**

**)**

问题二(文件名：T2.cpp)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5；

Id v,d;

Id A,B；

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0); //if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x));

if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5); if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233); if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5); if(x>=273.5&&x<339.5)return T4; if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5); return 25;

)

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(abs(STD[i][0]-tim[j])<1e-6)

(

CNT+=pow(1-THJ[MXI][j]/STD[i][1],2);

i++；

if(CNT>MINL)

return;

)

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

( if(abs(STD[i][0]-tim[j])<1e-6) (

TH[i]=THJ[MXI][j];

i++；

)

)

MINL=CNT;

MINA=A;

MINB=B;

)

inline void print()

freopen("T2s.out","w",stdout);

intj;

Id t,CNT=0; /\*for(j=0,t=0;t\*v<=500;t+=dt,j++) if(TGD(t\*v)>250)(

for(int ii=O;ii<=MXI;ii++) printf("%6.2Lf ,,,THJ[ii][j]);

puts—);}\*/

printf("%Lf %Lf %Lf\n",MINA,MINB,MINL); printf("%d\n",MXI);

int i=0; /\*for(j=0,t=0;t\*w=500;t+=dt,j++,puts("")) for(i=0;i<=MXI;i++) printf("%6.2Lf\t",THJ[i][j]);

\*/

/\*for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(t>=290.97&&t<=300)

(

printf("%Lf %Lf\n",t,tim[j]); for(int ii=O;ii<=MXI;ii++) printf("%6.7Lf\t",THJ[ii][j]); puts("");

// printf("%.2Lf %.2Lf\n",tim[j],THJ[MXI][j]);

//i++;

)

}\*/ for(i=1;i<=N;i++) printf("%.2Lf\n",TH[i]);

)

int main()

( T1=182,T2=203,T3=237,T4=254,T5=25;

v=7.8/6；

//d=0.015/2;

Id IIB;

d=0.015/2;

dt=0.001,dx=0.015/2/100;

freopen("s.in","r",stdin);

freopen("T2.out","w",stdout);

double a,b;

while(scanf(,,%lf%lf',&a,&b)==2)

STD[++N][0]=a;

STD[N][1]=b;

}

MINL=1e100;

A=6.4;// (6.4e-4 - 9.2e-4)

B=100;//(0.2-1)

// for(A=0.00005;A<=0.0002;A=A+0.00005)

// for(B=10；B<=50；B=B+10)

// for(A=0.09224;A>=0.06417;A=A-0.00001)

//for(B=-10;B>=-200;B=B-1) //t=0.0001

A=0.000010, B=54.600000；// C=478591.910061 Id ttp=40;

//for(x0=0;x0<=20;x0=x0+1) //for(A=0.00010;A<=0.00060;A+=0.00002)

// for(B=120;B<=300;B+=15)

//test

〃A=0.001,B=5;

A=0.0002;

B=68;

bool rt;

//for(A=0.0001 ;A<=0.00052;A+=0.0001)

// for(B=66;B<=73;B+=2)

//for(xO=1 ;x0<=24;x0+=2) xO=O;

Id Bt=1;

Id MINS=1e100;

//for(xO=1 ;x0<25;x0+=2)

//for(A=0.0001 ;A<=0.001 ;A+=0.0002)

// for(IIB=10;IIB<=100;IIB+=10)

// for(Bt=0.1;Bt<=1;Bt+=0.2)

Bt=0.3,x0=7,A=0.0003,l 旧=70;

for(v=10./6;v>=6.5/6;v-=0.1/6)

tp=5.0/ttp;

B=IIB;

rt=1；

Id Area=O;

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j； for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

int ni=1;

MXI=-1;

double ST=1e100,ED=-1;

double ST2=1e100,ED2=-1;

〃for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

/\*THJ[1]D+1]=TGD(t\*v);

THJ[1][1]=25;

THJ[2]0+1]=THJ[1][j+1]+dx\*B\*(THJ[1]0+1]-TGD((t+1)\*v));

THJ[2][j+1]=max(min(THJ[2][j],THJ[1][j+1]),THJ[2][j+1]);

THJ[2]0+1]=min(max(THJ[2]Q],THJ[1][j+1]))THJ[2]D+1]);\*/ //TH J[2]Q+1 ]=TH J[1 ][j]+B\*dx\*(TH J[1 ]D]-TGD(t\*v));

THJ[1]0+1]=THJ[2]0]+B\*dx\*(TGD(t\*v)-THJ[1][j]); //printf(,,%.1OLf\n,,,B\*dx\*(TGD(t\*v)-THJ[1]0]))；

if(rt&&THJ[1]0+1]<THJ[1]Q])

//if(rt&&THJ[MXI][j+1]<THJ[MXI][j])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

if。)

THJ[i+1][j+1]=(-(dx\*dx/dt/2/A\*(THJ[i]0+1]-THJ[i]0- 1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1]0+1]=25;

MXI=max(MXI,i+2); if(abs(STD[ni][0]-timO])<1 e-6)

{

if(ni<=N)

CNT+=pow(THJ[MXI][j]-STD[ni][1],2);

ni++;

if(CNT>2\*MINL)

( printf("Bt:%Lf\txO:%Lf\tA:%Lf\tB:%Lf\t\n",Bt,xO,A,IIB); puts("Over");

goto L;

)

}

THJ[MXI][j+1]=THJ[MXI-1][j+1]; if(abs(THJ[MXIJ0+1]-THJ[MXI]0])/dt>3)

goto pl；

if(THJ[MXI][j+1 ]>150&&ST>1 e10)

ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

(

ED=t；

if(ED-ST<60||ED-ST>120)

goto pl；

)

if(TH J[MXI]D+1 ]>217&&ST2> 1 e10)

ST2=t;

if(THJ[MXI][i+1]<217&&ST2<1e10)

(

ED2=t;

if(ED2-ST2<40&&ED2-ST2>90)

goto pl；

)

MAX=-1,Ld=-1;

ni=1;

for(j=0,t=0;t\*v<=500;t+=dt,j++) (

if(j%500==0)

(

TH[ni]=THJ[MXI][j];

MAX=max(MAX,TH[ni]);

N=ni++;

)

) if(MAX<240)

(

goto pl;

} if(MAX>250) goto pl；

MINL=CNT;

MINA=A;

MINB=B;

L:B=B\*Bt；

MINS=Area;

printf("v:%Lf\tYES\n",v\*60);

exit(O);

goto ed;

pl:printf("v:%Lf\tNo\n",v\*60);

J

ed:;

)

Print();

return 0;

)

**问题三(文件名：GreedyT3.cpp；说明：爬山代码)**

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5；

Id v,d;

Id A,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

if(x>x0&&x<25)return 25+(T1-25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x)); if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5); return 25;

)

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0; for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(abs(STD[i][0]-timO])<1e-6)

{

CNT+=pow(1-THJ[MXI][j]/STD[i][1],2);

i++；

if(CNT>MINL)

return;

)

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

(

if(abs(STD[i][0]-tim[j])<1e-6)

TH[i]=THJ[MXI]OJ；

i++；

MINL=CNT;

MINA=A;

MINB=B;

)

Id IIB;

Id ttp=4O;

Id Bt;

Id S[21][21][21][21][41];

Id solve()

//d=0.015/2;

d=0.015/2;

dt=O.OO1,dx=O.O15/2/100;

int t1,t2,t3,t4;

t1=int(T1+1e-1)-165;

t2=int(T2+1e-1)-184;

t3=int(T3+1e-1 )-224;

t4=int(T4+1e-1 )-244;

int vv=int(v\*60+1e-1)-65;

if(t1>20||t2>20||t3>20||t4>20||vv>35)return 1e100;

if(S[t1][t2][t3][t4][w]>1e-1)

return S[t1][t2][t3][t4][vv];

MINL=1e100;

bool rt;

Id MINS=1e100;

tp=5.0/ttp;

B=IIB;

rt=1;

int ad=1;

Id Area=0;

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

MXI=-1;

bool UP=false;

double ST=1e100,ED=-1;

double ST2=1e100,ED2=-1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

THJ[1J0+1]=THJ[2][j]+B\*dx\*(TGD(t\*v)-THJ[1]0])； tim[j]=t;

if(rt&&THJ[1]0+1]<THJ[1]Q])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

( if(j)

THJ[i+1]Q+1]=(-(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0- 1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1][j+1]=25;

MXI=max(MXI,i+2);

)

THJ[MXI][j+1]=THJ[MXI-1][j+1];

if(abs(THJ[MXI][j+1]-THJ[MXI][j])/dt>3) (

//puts("175H);

goto pl；｝

if(TH J[MXI][j+1 ]>150&&ST>1 e10)

ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

(

ED=t；

if(ED-ST<60||ED-ST>120)

〃puts("182"); goto pl；｝

if(THJ[MXI][j+1]>240)

UP=true;

if(THJ[MXI][j+1]>217)

(

if(ad&&THJ[MXI]Q+1]>THJ[MXI][j])

Area+=(THJ[MXI][j+1 ]-217)\*dt;

else ad=O;

if(Area>MINS)

(

//puts("191");

goto pl；｝ //if(Area+pow(THJ[MXI][j+1]-217,2)/6>MINS) // (//puts("193");

// goto pl；｝ if((!UP)&&Area+(240-THJ[MXI][j+1])\*(THJ[MXI][j+1]- 194)/6>MINS)

(

//puts("195");

goto pl；｝

)

if(THJ[MXI][j+1]>250)

(//puts("199");

goto pl；｝

if(TH J[MXI][j+1 ]>217&&ST2>1 e10)

ST2=t;

if(THJ[MXI][i+1]<217&&ST2<1e10)

(

ED2=t；

if(ED2-ST2<40&&ED2-ST2>90)

(//puts("207");

goto pl；｝

)

MAX=-1,Ld=-1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

MAX=max(MAX,THJ[MXI][j]);

if(MAX<240)

//printf("%Lf\n",MAX); for(int vi=vv;vi<=20;vi++)

S[t1][t2][t3][t4][vi]=1e100;

//puts("225");

goto pl；

) if(MAX>250)

(//puts("228");

for(int vi=vv;~vi;vi--)

S[t1][t2][t3][t4][vi]=1e100;

goto pl;}

MINL=CNT;

MINA=A; MINB=B; L:B=B\*Bt；

MINS=Area;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\t Area:%Lf\tYES\n",T1,T2,T3,T4,v\*60,Area);

goto ed;

pl:Area=1e100;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\tNo\n",T1,T2,T3,T4,v\*60);

ed:;

//printf("%Lf\n",Area);

//print();

return S[t1 ][t2][t3][t4][vv]=Area;

int main()

( //freopen("GreedyT3.out","w",stdout);

ldM=1e100,tp;

Bt=0.3,x0=7,A=0.0003,l 旧=70;

for(int xxx=1 ;xxx<=50;xxx++)

( if(xxx==1) T1=182,T2=203,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==2) T1=181,T2=203,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==3)

T1=182,T2=204,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==4)

T1=181,T2=204,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==5)

T1=175,T2=195,T3=235,T4=255,T5=25,v=7.0/6,M=solve();

else

〃puts("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*startselect"); do

T1=165+rand()%21,T2=185+rand()%21,T3=225+rand()%21,T4=245+rand ()%21,T5=25,v=(65+rand()%36)/60.;

while((M=solve())>1e10); 〃puts("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*endselect");

}

while(true)

int fl=-1;

T1=T1+1; tp=solve(); if(tp<M)fl=1,M=tp;

T1=T1-1;

T1=T1-1; tp=solve(); if(tp<M)fl=2,M=tp;

T1=T1+1;

T2=T2+1; tp=solve(); if(tp<M)fl=3,M=tp;

T2=T2-1;

T2=T2-1; tp=solve(); if(tp<M)fl=4,M=tp;

T2=T2+1;

T3=T3+1; tp=solve();

if(tp<M)fl=5,M=tp;

T3=T3-1；

T3=T3-1； tp=solve(); if(tp<M)fl=6,M=tp;

T3=T3+1;

T4=T4+1; tp=solve(); if(tp<M)fl=7,M=tp; T4=T4-1;

T4=T4-1; tp=solve(); if(tp<M)fl=8,M=tp; T4=T4+1;

v=v+1./60; tp=solve(); if(tp<M)fl=9,M=tp; v=v-1760;

v=v-1./60; tp=solve(); if(tp<M)fl=10,M=tp; v=v+1./60;

if(fl==-1) break;

if(fl==1)

T1+=1;

if(fl==2)

T1-=1;

if(fl==3)

T2+=1;

if(fl==4)

T2-=1;

if(fl==5)

T3+=1;

if(fl==6)

T3-=1；

if(fl==7)

T4+=1;

if(fl==8)

T4-=1;

if(fl==9)

v+=1./60;

if(fl==8)

v-=1./60;

// printf("%.OLf %.OLf %.OLf %.OLf %.0Lf\n",T1,T2,T3,T4,v\*60);

**}**

printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",T1,T2,T3,T4,v\*60,M);

**)**

**)**

**问题三(文件名：s.cpp)**

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<queue>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5;

Id v,d;

Id A,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

**(**

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x));

if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5);

return 25;

)

struct Pa

Id T1,T2,T3,T4,v;

Id M;

inline bool friend operator < (Pa a,Pa b)(return a.M>b.M;}

Pa()0；

Pa(ld t1,ld t2,ld t3,ld

t4,ld

vv,ld

MM):T1(t1),T2(t2),T3(t3),T4(t4),v(vv),M(MM)() void

print()(printf(,,%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",T1,T2,T3,T4,v\*60,M

)；)

}；

priority\_queue<Pa>Q;

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001 ][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0;

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

(

if(abs(STD[i][0]-tim[j])<1e-6)

(

CNT+=pow(1-THJ[MXI][j]/STD[i][1])2); i++； if(CNT>MINL) return;

)

)

fo「(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

if(abs(STD[i][0]-tim[j])<1e-6)

TH[i]=THJ[MXI]DJ; i++；

MINL=CNT;

MINA=A;

MINB=B;

)

Id IIB;

Id ttp=4O;

Id Bt;

Id S[21][21][21][21][41]; int Out[21][21][21][21][41];

Id solve()

//d=0.015/2;

d=0.015/2;

dt=O.OO1,dx=O.O15/2/100; intt1,t2,t3,t4;

t1=int(T1+1e-1)-165;

t2=int(T2+1e-1)-185;

t3=int(T3+1e-1 )-225;

t4=int(T4+1e-1 )-245;

int vv=int(v\*60+1e-1 )-65;

if(t1>20||t2>20||t3>20||t4>20||vv>35)return 1e100; if(S[t1][t2][t3][t4][vv]>1e-1)

return S[t1][t2][t3][t4][vv];

MINL=1e100;

bool rt;

Id MINS=1e100;

tp=5.0/ttp;

B=IIB;

rt=1；

Id Area=0;

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j；

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

fo「(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

MXI=-1;

bool UP=false;

int ad=1;

double ST=1e100,ED=-1;

double ST2=1e100,ED2=-1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

THJ[1]D+1]=THJ[2]0]+B\*dx\*(TGD(t\*v)-THJ[1]0])；

if(rt&&THJ[1]Q+1]<THJ[1]0])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

if(j)

THJ[i+1][j+1]=(-(dx\*dx/dt/2/A\*(THJ[i]0+1]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1][j+1]=25;

MXI=max(MXI,i+2);

)

THJ[MXI]D+1]=THJ[MXI-1][j+1];

if(abs(THJ[MXI][j+1]-THJ[MXI][j])/dt>3) (

//puts("175"); goto pl；｝

if(THJ[MXI][j+1 ]>150&&ST>1 e10) ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

ED=t;

if(ED-ST<60||ED-ST>120)

//puts("182n);

goto pl；｝

)

if(THJ[MXI][j+1]>240)

UP=true;

if(THJ[MXI]Q+1]>217)

(

if(ad&&THJ[MXI]0+1]>THJ[MXI][j])

Area+=(THJ[MXI]0+1]-217)\*dt;

else ad=0;

if(Area>MINS)

(

//puts("191"); goto pl；｝ //if(Area+pow(THJ[MXI][j+1]-217,2)/6>MINS) // (//puts("193");

// goto pl；｝ if((!UP)&&Area+(24O-THJ[MXI]0+1])\*(THJ[MXI][j+1]- 194)/6>MINS)

(

//puts("195"); goto pl；｝

)

if(THJ[MXI][j+1]>250)

(//puts("199");

goto pl；｝

if(TH J[MXI][j+1 ]>217&&ST2> 1 e10)

ST2=t;

if(THJ[MXI][i+1 ]<217&&ST2<1e10)

(

ED2=t；

if(ED2-ST2<40&&ED2-ST2>90) (//puts("207");

goto pl；｝

)

MAX=-1,Ld=-1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

MAX=max(MAX,THJ[MXI][j]);

if(MAX<240)

(

//printf("%Lf\n",MAX);

for(int vi=vv;vi<=20;vi++)

S[t1][t2][t3][t4][vi]=1e100;

//puts("225");

goto pl；

} if(MAX>250)

(//puts("228");

for(int vi=vv;~vi;vi--)

S[t1][t2][t3][t4][vi]=1e100;

goto pl;}

MINL=CNT;

MINA=A; MINB=B; L:B=B\*Bt；

MINS=Area;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\t

A「ea:%Lf\tYES\n",T1,T2,T3,T4,v\*60,Area);

goto ed;

pl:Area=1e100;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\tNo\n",T1,T2,T3,T4,v\*60);

ed:;

//printf("%Lf\n",Area);

//print();

if(Area<1e10)

Q.push(Pa(T1 ,T2,T3,T4,v,Area));

return S[t1 ][t2][t3][t4][vv]=Area;

int main()

(

〃freopen("A\*T3.out","w",stdout);

ldM=1e100,tp;

Bt=0.3,x0=7,A=0.0003,l 旧=70;

T5=25;

Pa L;

T1=184,T2=195,T3=230,T4=264,v=90./60,M=solve();//416.248 Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=179,T2=191,T3=242,T4=264,v=92./60,M=solve();//417.127 Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 88./60,M=solve();〃

T1=167,T2= 201,T3= 235,T4=

417.349

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=169,T2= 192,T3= 233,T4=

417.368

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=179,T2= 201,T3= 236,T4=

417.521

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=175,T2= 197,T3= 231,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=183, T2=197,T3= 240,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=184,T2= 193,T3= 239,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=179,T2= 191,T3= 242,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=179,T2= 201,T3= 236,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=184,T2= 195,T3= 230,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=180,T2= 193,T3= 239,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 86./60,M=solve();//

264,v= 92./60,M=solve();〃

264,v= 88./60,M=solve();〃 417.57

264,v= 94./60,M=solve();

264,v= 93./60,M=solve();

264,v= 92./60,M=solve();

264,v= 92./60,M=solve();

264,v= 90./60,M=solve();

263,v= 90./60,M=solve();

for(T1=165;T1<186;T1++)

for(T2=185;T2<206;T2++)

for(T3=225;T3<246;T3++)

for(T4=245;T4<266;T4++) for(v=65./60. ;v<101./60.;v+=0.1 /6)

Q.push(Pa(T1 ,T2,T3,T4,v, 1 e100)); int NU=0;

Pa Best=Pa(-1,-1,-1,-1,-1,1e100); while(!Q.empty())

(

int fl=-1;

Pa Fr=Q.top();

Q-popO;

T1=Fr.T1;

T2=Fr.T2;

T3=Fr.T3;

T4=Fr.T4;

v=Fr.v;

M=Fr.M;

int t1,t2,t3,t4,vv; t1=int(T1+1e-1)-165; t2=int(T2+1e-1)-185; t3=int(T3+1e-1 )-225; t4=int(T4+1e-1 )-245; vv=int(v\*60+1e-1 )-65;

//printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",T1,T2,T3,T4!v\*60,M);

// puts("1");

if(Out[t1][t2][t3][t4][w])

goto ed;

Out[t1][t2][t3][t4][vv]=1;

// puts("-1\n\n");

if(M>=solve()-1e-6)

Fr.M=solve();

else

(puts("???");goto ed;}

if(Fr.M<Best.M)

Best=Fr;

NU++;

if(NU%10==0)

printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",Best.T1,Best.T2,Best.T

3,Best.T4,Best.v\*60,Best.M);

T1=T1+1; tp=solve(); if(tp<M)fl=1,M=tp;

T1=T1-1;

T1=T1-1; tp=solve(); if(tp<M)fl=2,M=tp;

T1=T1+1;

T2=T2+1; tp=solve(); if(tp<M)fl=3,M=tp;

T2=T2-1;

T2=T2-1; tp=solve(); if(tp<M)fl=4,M=tp;

T2=T2+1;

T3=T3+1; tp=solve(); if(tp<M)fl=5,M=tp;

T3=T3-1;

T3=T3-1; tp=solve(); if(tp<M)fl=6,M=tp;

T3=T3+1;

T4=T4+1; tp=solve(); if(tp<M)fl=7,M=tp;

T4=T4-1;

T4=T4-1; tp=solve(); if(tp<M)fl=8,M=tp;

T4=T4+1;

v=v+1./60; tp=solve(); if(tp<M)fl=9,M=tp; v=v-1./60;

v=v-1./60;

tp=solve();

if(tp<M)fl=10,M=tp;

v=v+1./60;

ed:;

// printf("%.OLf %.OLf %.OLf %.OLf %.0Lf\n",T1,T2,T3,T4,v\*60);

)

)

问题四(文件名：GreedyT4.cpp)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5；

Id v,d;

Id A,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1-25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x)); if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1+(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5);

return 25;

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

struct Pa

(

Id T1,T2,T3,T4,v;

IdM;

inline bool friend operator < (Pa a,Pa b)(return a.M>b.M;}

Pa()()；

Pa(ld t1,ld t2,ld t3,ld t4,ld vv,ld

MM):T1(t1),T2(t2),T3(t3),T4(t4),v(vv),M(MM)()

void

print()(printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n,,,T1,T2,T3,T4,v\*60,M )；)

}；

Id BIG1=-1,BIG2=-2;

struct pr

(

Id x,y;

//inline bool friend operator < (Pa a,Pa b)(return a.M>b.M;}

P「(){}；

pr(ld a,Id b):x(a),y(b)()

inline bool friend operator < (pr a,pr b)(return

a.x/BIG1 +a.y/BIG2<b.x/BIG1 +b.y/BIG2;}

}；

intN,MXI;

Id MINL,MINA,MINB;

Id STD[100001 ][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0;

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

if(abs(STD[i][0]-timO])<1e-6)

CNT+=pow(1-THJ[MXI][j]/STD[i][1])2); i++；

if(CNT>MINL)

return;

)

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

(

if(abs(STD[i][0]-tim[j])<1e-6)

(

TH[i]=THJ[MXI][j];

i++；

}

)

MINL=CNT;

MINA=A;

MINB=B;

Id IIB;

Id ttp=40;

Id Bt;

pr S[21][21][21][21][41];

pr solve()

(

//d=0.015/2;

d=0.015/2;

dt=O.OO1,dx=O.O15/2/100;

int t1,t2,t3,t4;

t1=int(T1+1e-1)-165;

t2=int(T2+1e-1)-184;

t3=int(T3+1e-1 )-224;

t4=int(T4+1e-1 )-244;

int vv=int(v\*60+1e-1)-65; if(t1>20||t2>20||t3>20||t4>20||vv>35)return pr(1e100,1e100);

if(S[t1][t2][t3][t4][vv].x>1e-1)

return S[t1][t2][t3][t4][vv];

MINL=1e100;

bool rt;

Id MINS=1e100;

int LI,Rr;

tp=5.0/ttp;

B=IIB;

rt=1;

Id Area=O;

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j; for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

MXI=-1;

Id sys,PPP;

bool UP=false;

double ST=1e100,ED=-1;

int ad=1;

double ST2=1e100,ED2=-1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

THJ[1]Q+1]=THJ[2]g]+B\*dx\*(TGD(t\*v)-THJ[1]0])；

if(rt&&THJ[1]0+1]<THJ[1]Q])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

if(j)

THJ[i+1]0+1]=(-(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1]0+1]=25;

MXI=max(MXI,i+2);

THJ[MXI]0+1]=THJ[MXI-1][j+1];

if(abs(THJ[MXI][j+1]-THJ[MXI][j])/dt>3)

( //puts("175"); goto pl；｝

if(THJ[MXI][j+1]>150&&ST>1e10)

ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

(

ED=t； if(ED-ST<60||ED-ST>120)

(

//puts("182");

goto pl；｝

)

if(THJ[MXI][j+1]>240)

UP=true;

if(THJ[MXI][j+1]>217)

(

if(ad&&THJ[MXI][j+1]>THJ[MXI][j])

Area+=(THJ[MXI][j+1]-217)\*dt;

else ad=0;

/\* if(Area>MINS)

(

〃puts("191");

goto pl；｝

// if(Area+pow(THJ[MXI][j+1]-217,2)/6>MINS)

// (//puts("193");

// goto pl；｝

if((!UP)&&Area+(24O-THJ[MXI][j+1])\*(THJ[MXI]0+1]- 194)/6>MINS)

(

//puts("195");

goto pl；｝\*/

)

if(THJ[MXI][j+1]>250)

(//puts(,,199M);

goto pl；｝

if(THJ[MXI][j+1 ]>217&&ST2>1 e10)

ST2=t,LI=j+1;

if(THJ[MXI][i+1]<217&&ST2<1e10)

(

ED2=t;

Rr=j+1;

if(ED2-ST2<40&&ED2-ST2>90) (//puts("207");

goto pl；}

)

MAX=-1,Ld=-1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

MAX=max(MAX,THJ[MXI][j]);

if(MAX<240)

( //printf("%Lf\n",MAX);

for(int vi=vv;vi<=20;vi++)

S[t1 J[t2][t3][t4][vi]=pr( 1 e100,1 e100);

//puts("225");

goto pl；

)

if(MAX>250) (//puts("228");

for(int vi=vv;~vi;vi--)

S[t1 ][t2][t3][t4][vi]=pr(1 e100,1 e100); goto pl;}

sys=0;

PPP=Rr-LI;

while(LKRr)

(

sys+=pow(THJ[MXI][Rr]-THJ[MXI][LI],2);

Rr-;LI++;

)

sys/=PPP;

MINL=CNT;

MINA=A;

MINB=B;

L:B=B\*Bt；

MINS=Area;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\t Area:%Lf\tYES\n",T1,T2,T3,T4,v\*60,Area);

goto ed;

pl:Area=1e100; //printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\tNo\n",T1,T2,T3,T4,v\*60);

J

ed:;

〃p「intf("%Lf\n",A「ea);

//print();

return S[t1][t2][t3][t4][vv]=pr(Area,sys);

} int main()

( //freopen("GreedyT4.out","w",stdout);

pr M,tp;

Bt=0.3,x0=7,A=0.0003,l 旧=70;

for(int xxx=1:xxx<=10;xxx++)

(

do

T1=165+rand()%21,T2=185+rand()%21,T3=225+rand()%21,T4=245+rand ()%21,T5=25,v=(65+rand()%36)/60.;

while((M=solve()).x>1e10);

BIG1=max(BIG1,M.x);

BIG2=max(BIG2,M.y);

}

for(int xxx=1 ;xxx<=50;xxx++)

( if(xxx==1) T1=182,T2=203,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==2) T1=181,T2=203,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==3)

T1=182,T2=204,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==4)

T1=181,T2=204,T3=237,T4=254,T5=25,v=7.6/6,M=solve();

else if(xxx==5)

T1=175,T2=195,T3=235,T4=255,T5=25,v=7.0/6,M=solve();

else

//puts(

”\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

startselect"

）；

do

T1 =165+rand()%21 ,T2=185+rand()%21 ,T3=225+rand()%21 ,T4=245+rand ()%21,T5=25,v=(65+rand()%36)/60.;

while((M=solve()).x>1e10); 〃puts("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*endselect");

}

while(true)

int fl=-1; T1=T1+1; tp=solve(); if(tp<M)fl=1,M=tp;

T1=T1-1;

T1=T1-1; tp=solve(); if(tp<M)fl=2,M=tp;

T1=T1+1;

T2=T2+1; tp=solve(); if(tp<M)fl=3,M=tp;

T2=T2-1;

T2=T2-1; tp=solve(); if(tp<M)fl=4,M=tp;

T2=T2+1;

T3=T3+1; tp=solve(); if(tp<M)fl=5,M=tp;

T3=T3-1;

T3=T3-1； tp=solve(); if(tp<M)fl=6,M=tp;

T3=T3+1;

T4=T4+1; tp=solve(); if(tp<M)fl=7,M=tp;

T4=T4-1;

T4=T4-1; tp=solve(); if(tp<M)fl=8,M=tp;

T4=T4+1;

v=v+1./60; tp=solve(); if(tp<M)fl=9,M=tp; v=v-1./60;

v=v-1./60; tp=solve(); if(tp<M)fl=10,M=tp; v=v+1./60;

if(fl==-1) break;

if(fl==1)

T1+=1;

if(fl==2)

T1-=1;

if(fl==3)

T2+=1;

if(fl==4)

T2-=1;

if(fl==5)

T3+=1；

if(fl==6)

T3-=1；

if(fl==7)

T4+=1;

if(fl==8)

T4-=1:

if(fl==9) v+=1./60;

if(fl==8)

v-=1./60;

// printf("%.OLf %.OLf %.OLf %.OLf %.0Lf\n",T1,T2,T3,T4,v\*60);

)

printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%Lf\t%Lf\t%.5Lf\n",T1,T2,T3,T4, v\*60,M.x,M.y,M.x/BIG1+M.y/BIG2);

)

)

问题四(文件名:sT4.cpp)

#include<cstdio>

#include<cstdlib>

#include<cmath>

#include<queue>

#include<iostream>

using namespace std;

#define Id long double

Id T1,T2,T3,T4,T5;

Id v,d;

ldA,B;

Id tp;

Id dt,dx;

Id xO;

inline Id TGD(ld x)//管道内部温度随x变化的

(

if(x>x0&&x<25)return 25+(T1 -25.0)/25\*(x-x0);

//if(x>0&&x<25)return 25+(T1 -25)\*exp(-tp\*(25-x));

if(x>=25&&x<197.5)return T1;

if(x>=197.5&&x<202.5)return T1 +(T2-T1 )/5.\*(x-197.5);

if(x>=202.5&&x<233)return T2;

if(x>=233&&x<238)return T2+(T3-T2)/5.0\*(x-233);

if(x>=238&&x<268.5)return T3;

if(x>=268.5&&x<273.5)return T3+(T4-T3)/5.\*(x-268.5);

if(x>=273.5&&x<339.5)return T4;

if(x>=339.5&&x<344.5)return T4+(T5-T4)/5.\*(x-339.5); return 25;

Id BIG1=-1,BIG2=-2;

struct pr

{

Id x,y;

//inline bool friend operator < (Pa a,Pa b)(return a.M>b.M;}

P「(){}；

pr(ld a,Id b):x(a),y(b)()

inline bool friend operator < (pr a,pr b)(return

a.x/BIG1 +a.y/BIG2<b.x/BIG1 +b.y/BIG2;}

｝；

struct Pa

(

Id T1,T2,T3,T4,v;

pr M;

inline bool friend operator < (Pa a,Pa b)(return b.M<a.M;}

Pa()()；

Pa(ld t1,ld t2,ld t3,ld t4,ld vv,pr

MM):T1(t1),T2(t2),T3(t3),T4(t4),v(vv),M(MM)() void

print()(printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n,,,T1,T2,T3,T4,v\*60,M

.x/BIG1+M.y/BIG2);}

}；

priority\_queue<Pa>Q;

Id TH[900000];

Id THJ[220][500000];//i x j 时间

Id tim[900000];

intN.MXI;

Id MINL,MINA,MINB;

Id STD[100001 ][2];

inline void cp()

(

intj;

double t,CNT=0;

int i=0; fo「(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++) (

if(abs(STD[i][0]-tim[j])<1e-6)

{

CNT+=pow(1-THJ[MXI]D]/STD[i][1],2);

i++；

if(CNT>MINL)

return;

)

)

for(j=0,t=0;t\*v<=500&&i<=N;t+=dt,j++)

( if(abs(STD[i][0]-timO])<1e-6) (

TH[i]=THJ[MXI][j];

i++；

)

)

MINL=CNT;

MINA=A;

MINB=B;

Id IIB;

Id ttp=40;

Id Bt;

pr S[21][21][21][21][41];

int Out[21][21][21][21][41];

pr solve()

(

//d=0.015/2;

d=0.015/2;

dt=O.OO1,dx=O.O15/2/100;

int t1,t2,t3,t4;

t1=int(T1+1e-1)-165;

t2=int(T2+1e-1)-185;

t3=int(T3+1e-1 )-225;

t4=int(T4+1e-1 )-245;

int vv=int(v\*60+1e-1)-65; if(t1>20||t2>20||t3>20||t4>20||vv>35)return pr(1e100,1e100);

if(S[t1][t2][t3][t4][vv].x>1e-1)

return S[t1][t2][t3][t4][vv];

MINL=1e100;

bool rt;

Id MINS=1e100;

int LI,Rr;

tp=5.0/ttp;

B=IIB;

rt=1;

Id Area=O;

Id xx,t;

Id CNT=O,MAX,Ld,Hd;

int i,j; for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][0]=25;

for(i=2,xx=0;xx<=d;xx+=dx,i++)

THJ[i+1][1]=25;

THJ[0][0]=25;

THJ[1][0]=25；

THJ[2][0]=25；

THJ[2][1]=25；

MXI=-1;

Id sys,PPP;

bool UP=false;

double ST=1e100,ED=-1;

double ST2=1e100,ED2=-1;

int ad=1;

//for(j=0,t=0;t\*v<=500;t+=dt,j++) for(j=0,t=0;t\*v<=500;t+=dt,j++)

(

THJ[1]Q+1]=THJ[2]g]+B\*dx\*(TGD(t\*v)-THJ[1]0])；

if(rt&&THJ[1]0+1]<THJ[1]Q])

A=A,B=B\*Bt,rt=false;

for(i=1 ,xx=O;xx<=d;xx+=dx,i++)

(

if(j)

THJ[i+1]0+1]=(-(dx\*dx/dt/2/A\*(THJ[i][j+1]-THJ[i]0-

1]))+THJ[i][j]+THJ[i+2][j])/2;

else THJ[i+1]0+1]=25;

MXI=max(MXI,i+2);

THJ[MXI]0+1]=THJ[MXI-1][j+1];

if(abs(THJ[MXI][j+1]-THJ[MXI][j])/dt>3)

( //puts("175"); goto pl；｝

if(THJ[MXI][j+1]>150&&ST>1e10)

ST=t;

if(THJ[MXI][j+1]>190&&ED<0)

(

ED=t； if(ED-ST<60||ED-ST>120)

(

//puts("182");

goto pl；｝

)

if(THJ[MXI][j+1]>240)

UP=true;

if(THJ[MXI][j+1]>217)

(

if(ad&&THJ[MXI][j+1]>THJ[MXI][j])

Area+=(THJ[MXI][j+1]-217)\*dt;

else ad=0;

/\* if(Area>MINS)

(

〃puts("191");

goto pl；｝

// if(Area+pow(THJ[MXI][j+1]-217,2)/6>MINS)

// (//puts("193");

// goto pl；｝

if((!UP)&&Area+(24O-THJ[MXI][j+1])\*(THJ[MXI]0+1]- 194)/6>MINS)

(

//puts("195");

goto pl；｝\*/

)

if(THJ[MXI][j+1]>250)

(//puts(,,199M);

goto pl；｝

if(THJ[MXI][j+1 ]>217&&ST2>1 e10)

ST2=t,LI=j+1;

if(THJ[MXI][i+1]<217&&ST2<1e10)

(

ED2=t;

Rr=j+1;

if(ED2-ST2<40&&ED2-ST2>90) (//puts("207");

goto pl；}

)

MAX=-1,Ld=-1;

for(j=0,t=0;t\*v<=500;t+=dt,j++)

MAX=max(MAX,THJ[MXI][j]);

if(MAX<240)

( //printf("%Lf\n",MAX);

for(int vi=vv;vi<=20;vi++)

S[t1 J[t2][t3][t4][vi]=pr( 1 e100,1 e100);

//puts("225");

goto pl；

)

if(MAX>250) (//puts("228");

for(int vi=vv;~vi;vi--)

S[t1 ][t2][t3][t4][vi]=pr(1 e100,1 e100); goto pl;}

sys=0;

PPP=Rr-LI;

while(LKRr)

(

sys+=pow(THJ[MXI][Rr]-THJ[MXI][LI],2);

Rr-;LI++;

)

sys/=PPP;

MINL=CNT;

MINA=A;

MINB=B;

L:B=B\*Bt；

MINS=Area;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\t Area:%Lf\tYES\n",T1,T2,T3,T4,v\*60,Area);

goto ed;

pl:Area=1e100;

//printf("T1:%Lf\tT2:%Lf\tT3:%Lf\tT4:%Lf\tv:%Lf\tNo\n",T1,T2,T3,T4,v\*60);

ed:;

//printf("%Lf\n",Area);

//print();

if(Area<1e10)

Q.push(Pa(T 1 ,T2,T3,T4,v,pr(Area,sys))); return S[t1 ][t2][t3][t4][vv]=pr(Area,sys);

} int main()

(

//freopen("A\*T3.out","w",stdout);

pr M=pr(1e100,1e100),tp; Bt=0.3,x0=7,A=0.0003,IIB=70;

Pa L;

for(int xxx=1 ;xxx<=10;xxx++)

(

do

T1=165+rand()%21,T2=185+rand()%21,T3=225+rand()%21,T4=245+rand ()%21,T5=25,v=(65+rand()%36)/60.;

while((M=solve()).x>1e10);

BIG1=max(BIG1,M.x);

BIG2=max(BIG2,M.y);

)

T5=25;

T1=183, T2=197,T3= 240,T4= 264,v= 94./60,M=solve();

Q.push(Pa(T1 ,T2,T3,T4,v,M));

T1=184,T2= 193,T3= 239,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 93./60,M=solve();

T1=179,T2= 191,T3= 242,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 92./60,M=solve();

T1=179,T2= 201,T3= 236,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 92./60,M=solve();

T1=184,T2= 195,T3= 230,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

264,v= 90./60,M=solve();

T1=180,T2= 193,T3= 239,T4=

Q.push(Pa(T1 ,T2,T3,T4,v,M));

263,v= 90./60,M=solve();

for(T1=165;T1<186;T1++)

for(T2=185;T2<206;T2++)

for(T3=225;T3<246;T3++)

for(T4=245;T4<266;T4++)

for(v=65./60.;v<101./60.;v+=0.1/6)

Q.push(Pa(T1,T2,T3,T4,v,pr(1e100,1e100)));

int NU=O;

Pa Best=Pa(-1,-1,-1,-1,-1,pr(1e100,1e100));

printf("%Lf %Lf\n",BIG1,BIG2); while(!Q.empty())

(

int fl=-1;

Pa Fr=Q.top();

Q-POP()；

T1=Fr.T1;

T2=Fr.T2;

T3=Fr.T3;

T4=Fr.T4; v=Fr.v;

M=Fr.M; intt1,t2,t3,t4,vv; t1=int(T1+1e-1)-165; t2=int(T2+1e-1)-185; t3=int(T3+1e-1 )-225; t4=int(T4+1e-1 )-245; vv=int(v\*60+1e-1 )-65;

//printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.3Lf\n",T1,T2,T3,T4,v\*60,M);

// puts("1");

if(Out[t1][t2][t3][t4][w])

goto ed;

Out [t1][t2][t3][t4][vv]=1;

// puts("-1\n\n");

if(M.x/BIG1+M.y/BIG2>=solve().x/BIG1+solve().y/BIG2-1e-6)

Fr.M=solve();

else

{puts("???");goto ed;}

if(Fr.M<Best.M)

Best=Fr;

NU++;

if(NU%10==0)

printf("%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%.0Lf\t%Lf\t%Lf\t%.6Lf\n",Best.T1,Best .T2,Best.T3,Best.T4,Best.v\*60,Best.M.x,Best.M.y,Best.M.x/BIG1+Best.M.y/BI G2);

T1=T1+1;

tp=solve();

if(tp<M)fl=1,M=tp;

T1=T1-1;

T1=T1-1; tp=solve(); if(tp<M)fl=2,M=tp;

T1=T1+1;

T2=T2+1; tp=solve(); if(tp<M)fl=3,M=tp;

T2=T2-1;

T2=T2-1; tp=solve();

if(tp<M)fl=4,M=tp;

T2=T2+1;

T3=T3+1； tp=solve();

if(tp<M)fl=5,M=tp;

T3=T3-1;

T3=T3-1； tp=solve();

if(tp<M)fl=6,M=tp;

T3=T3+1;

T4=T4+1;

tp=solve();

if(tp<M)fl=7,M=tp;

T4=T4-1;

T4=T4-1;

tp=solve();

if(tp<M)fl=8,M=tp;

T4=T4+1;

v=v+1./60;

tp=solve(); if(tp<M)fl=9,M=tp;

v=v-1./60;

v=v-1./60;

tp=solve();

if(tp<M)fl=10,M=tp;

v=v+1./60;

ed:;

// printf("%.OLf %.OLf %.OLf %.OLf %.0Lf\n",T1,T2,T3,T4,v\*60);

}