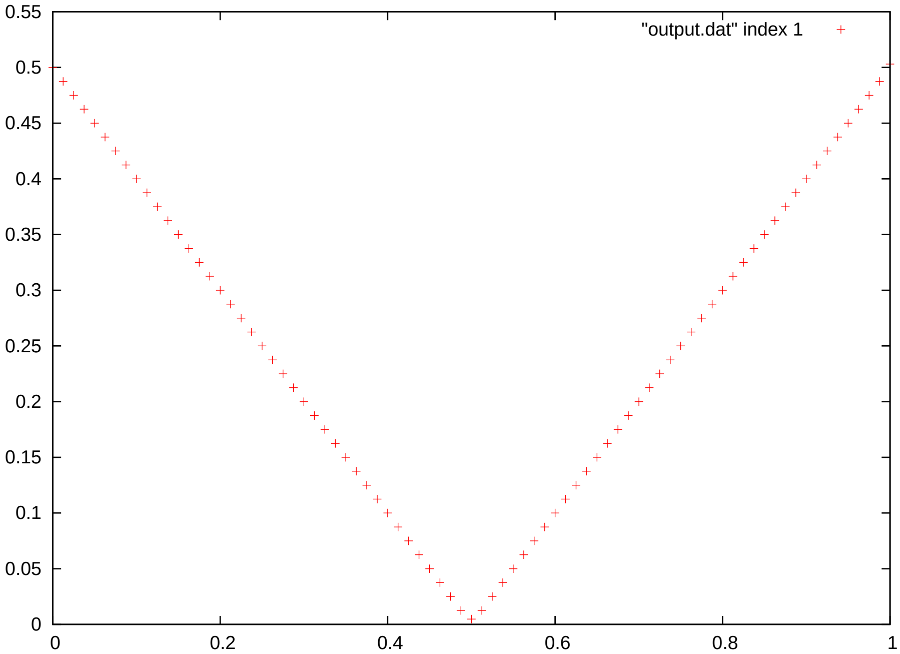
I wrote a program called heat.c. The program was this:

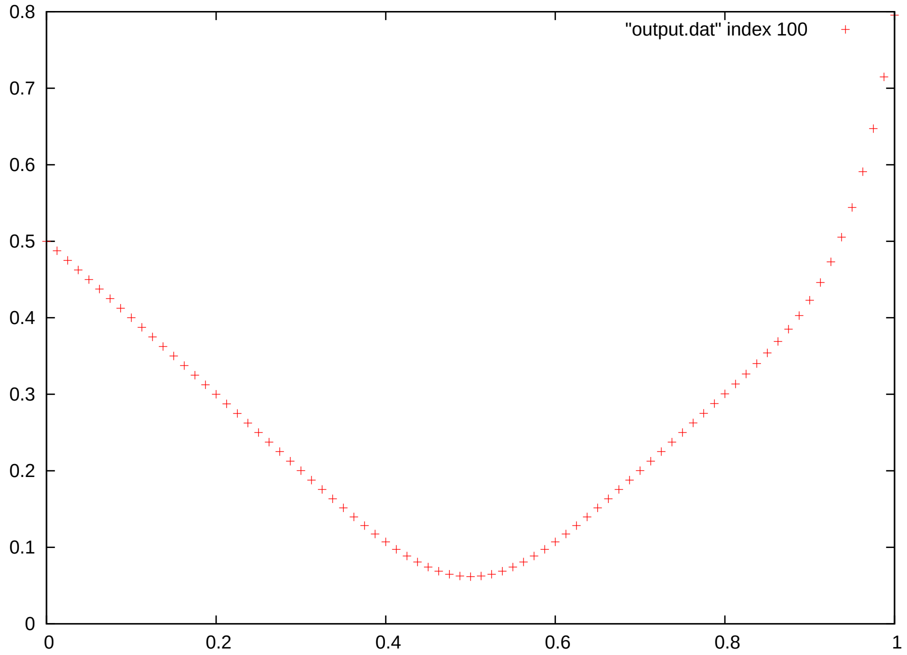
```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <string.h>

#define K 80
#define T 3.0
#define N 1000
#define NU 0.01

double u[K+1],un[K+1];

double f(double x){
    return fabs(x-0.5);
}
double a(double t){
    return 0.5;
}
double b(double t){
    return 0.5+sin(t);
}
void pheat(){
    int k;
    double dx=1.0/K;
    for(k=0;k<=K;k++){
        double xk=k*dx;
        printf("%24.15e %24.15e\n",xk,u[k]);
    }
}

main(){
    int k;
    double dx=1.0/K;
    for(k=0;k<=K;k++){
        double xk=k*dx;
        u[k]=f(xk);
    }
    pheat();
    int n;
    double dt=T/N,dx2=dx*dx;
    for(n=1;n<=N;n++){
        double tn=n*dt;
        un[0]=a(tn);       // eq 1.2.11
        for(k=1;k<K;k++){  // eq 1.2.9
            un[k]=u[k]+NU*dt/dx2
                 *(u[k+1]-2*u[k]+u[k-1]);
        }
        un[K]=b(tn);       // eq 1.2.12
```

```
        memcpy(u,un,sizeof(u));
        printf("\n\n#tn=%24.15e\n",tn);
        pheat();
    }
    return 0;
}

```

The initial condition was this:



The output at time tn where n=100 was this:


"output.dat" index 100
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.2
0.4
0.6
0.8
1