**% Sample 11**

**L = 1;**

**T = .2;**

**a = 1;**

**f = @(x,t) 0;**

**u0 = @(x) sin(pi\*x);**

**gleft = @(t) 0;**

**gright = @(t) 0;**

**nx = 13;**

**nt = 97;**

**u = heat1(f, u0, gleft, gright, a, nx, nt, L, T);**

**hx = L/(nx-1);**

**ht = T/(nt-1);**

**x = 0 : hx : L;**

**t = 0 : ht : T;**

**surf(x, t, u');**

**axis([0 1 0 .2 0 1]);**

**set(gca,'xtick', 0 : .2 : 1);**

**set(gca,'ytick', 0 : .05 : .2);**

**set(gca,'ztick', 0 : .2 : 1);**

**xlabel('x');**

**ylabel('t');**

**zlabel('u');**

**title('Sample 11');**

**% function heat1**

**function u = heat1(f, u0, gleft, gright, a, nx, nt, L, T)**

**hx = L/(nx-1);**

**ht = T/(nt-1);**

**u = zeros(nx, nt);**

**for(i = 1 : nx)**

**u(i,1) = u0( (i-1)\*hx );**

**end**

**for(k = 2 : nt)**

**u(1,k) = gleft( (k-1)\*ht );**

**u(nx,k) = gright( (k-1)\*ht );**

**end**

**for(k = 2 : nt)**

**for(i = 2 : nx-1)**

**u(i,k) = ht\*a/hx^2\*( u(i-1,k-1) - 2\*u(i,k-1) + u(i+1,k-1) ) ...**

**+ ht \* f( (i-1)\*hx, (k-2)\*ht ) + u(i,k-1);**

**end**

**end**