**% Name (first and last)**

**% CSC 2262**

**% cs2262xx**

**% Sample 12**

**L = 2\*pi;**

**T = 6;**

**a = 1/(4\*pi^2);**

**f = @(x,t) 2\*exp(-t/2)\*sin(x/2);**

**u0 = @(x) sin(x/2);**

**v0 = @(x) -sin(x/2);**

**gleft = @(t) sin(pi/6\*t);**

**gright = @(t) sin(pi/12\*t);**

**nx = 21;**

**nt = 31;**

**u = wave1(f,u0,v0,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 7 0 6 0 14]);**

**set(gca,'xtick',0:7);**

**set(gca,'ytick',0:6);**

**set(gca,'ztick',0:2:14);**

**xlabel('x');**

**ylabel('t');**

**zlabel('u');**

**title('Sample 12');**

**% function wave1**

**function u = wave1(f,u0,v0,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**

**k = 2;**

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

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

**+ ht^2\*f((i-1)\*hx,(k-2)\*ht) + u(i,k-1) + ht\*v0((i-1)\*hx);**

**end**

**for(k = 3:nt)**

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

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

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

**end**

**end**

**end**