```
% 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
```