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% Matt McDade
% ANM 2
% Homework 9 Part 2

dx = 1e-2;  x = 0:dx:10;
dt = 1e-4;  t = 0:dt:3;
N = length(x);
nmax = length(t);
np = (nmax-1)/10;

u2 = zeros(N,2);

a = 4;
f = @(t) t/2;
g = @(x) exp(-2*(x-3).^2);

R = fu(u)*dt/dx;

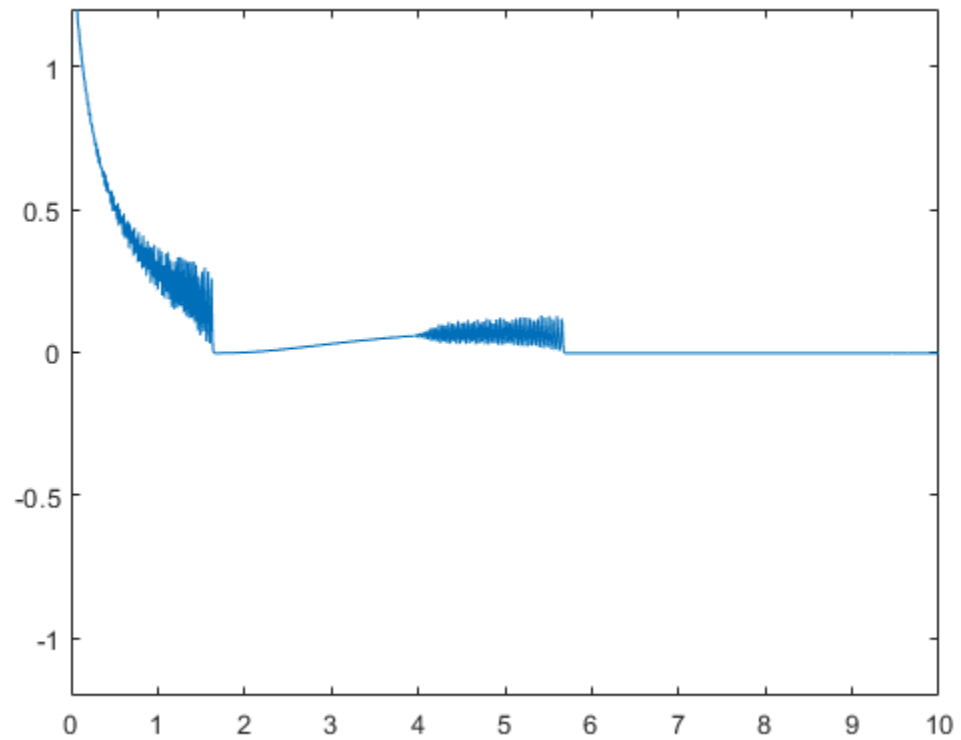
u2(:,1) = g(x);
figure(1)
plot(x,u2(:,1),'r')
title('Conservative Lax-Wendroff')
axis([0 10 -1.2 1.2])
pause

for n=1:nmax-1
    u2(1,2) = f(t(n+1));
    for i=2:N-1
        R = fu(u2(i,1))*dt/dx;
        if (i == N-1)
            uxx = 0;
        else
            uxx = fu(u2(i+1,1))-fu(u2(i,1)) - fu(u2(i,1))-
fu(u2(i-1,1));
        end
        ux = fu(u2(i+1,1))-fu(u2(i-1,1));
        u2(i,2) = u2(i,1) - .5*R*ux + .5*R^2*uxx;
    end
    u2(N,2) = 2*u2(N-1,2) - u2(N-2,2);
    if (mod(n,np)==0)
        plot(x,u2(:,2))
        axis([0 10 -1.2 1.2])
        pause(0.2)
        fprintf('%d\n',n)
    end
    u2(:,1) = u2(:,2);
end

function z = fu(u)
    z = (u+1).^2 / 10 + 2*u;
end

3000
```

6000
9000
12000
15000
18000
21000
24000
27000
30000



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