

Question 1 (i) (The derivation for $dh/dt(n)$ can be found on the other PDF)

```
%No. of Points
N=100;

%Range of x
x0=linspace(0,1,N);

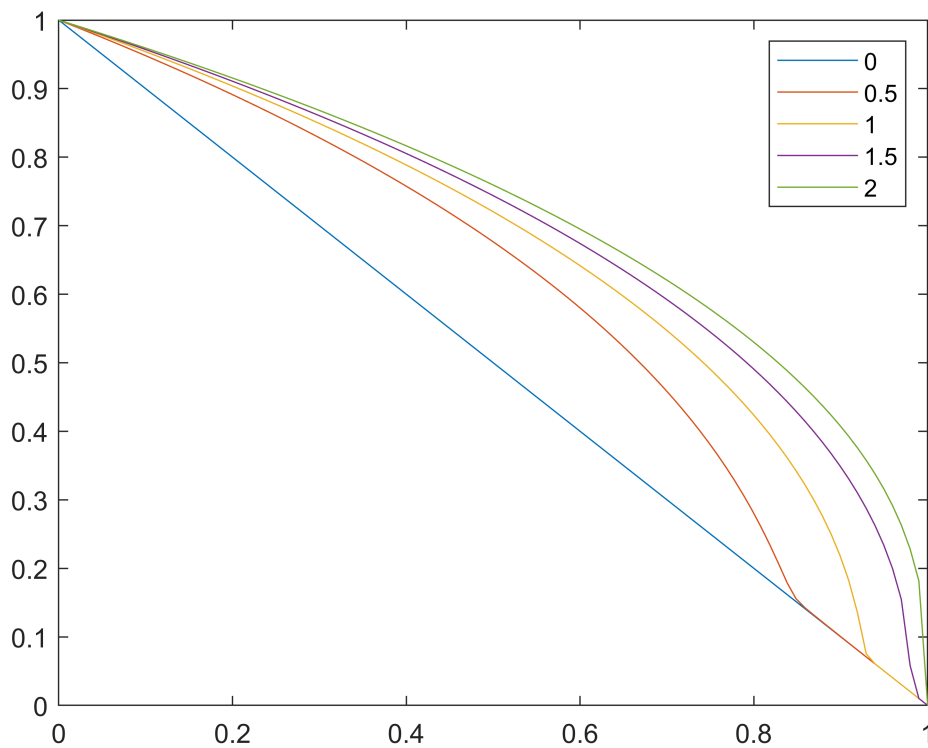
%Spatial Step Size
dx=x0(2)-x0(1);

%Initial Condition
h0 = 1-x0;

%Times that we need to plot
Tspan= 0:0.5:2;

%Solver
[t,h]=ode15s(@(t,h) deriv(t,h,N,dx),Tspan,h0);

%Plotter
for jj=1:length(Tspan)
    plot(x0,h(jj,:)); hold on
end
legend('0','0.5','1','1.5','2')
```



```
function dhdt=deriv(t,h,N,dx)
    dhdt = zeros(N,1); %Column vector

    for n=2:N-1
        dhdt(n) = (0.03125/dx^4)*((h(n+1)+h(n)).^2*(h(n+1).^2-h(n).^2).^3-(h(n)+h(n-1)).^2*(h(n)+h(n-1)).^2);
    end

    dhdt(1)=0;
    dhdt(N)=0;
end
```