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% Cory Wolfe

Question 1

```
%a.
x = linspace(1,2);
ya = x.^-1.5+x.^-.5*8.88178*10^-16;
%b.
xb = [1,1.2,1.4,1.6,1.8,2];
yb = eye(6,1);
yb(1) = 1;
yb(2) = (yb(1)+3*-1.5*.2*1.2)/1.75
yb(3) = (yb(2)+3*-1.5*.2*1.4)/1.75
yb(4) = (yb(3)+3*-1.5*.2*1.6)/1.75
yb(5) = (yb(4)+3*-1.5*.2*1.8)/1.75
yb(6) = (yb(5)+3*-1.5*.2*2)/1.75
%c.
[xc,yc] = ode23s(@eulercauchy,[1,2],[1,-1.5])
plot(x,ya)
hold
plot(xb,yb)
plot(xc(:,1),yc(:,1))
hold
legend('Analytical','Implicit Euler','MATLAB Solver')
```

yb =

```
1.0000
-0.0457
0
0
0
0
```

yb =

```
1.0000
-0.0457
-0.7461
0
```

0
0

$y^b =$

1.0000
-0.0457
-0.7461
-1.2492
0
0

$y^b =$

1.0000
-0.0457
-0.7461
-1.2492
-1.6396
0

$y^b =$

1.0000
-0.0457
-0.7461
-1.2492
-1.6396
-1.9655

$x^c =$

1.0000
1.0382
1.1382
1.2382
1.3382
1.4382
1.5382
1.6382
1.7382
1.8382
1.9382
2.0000

$y^c =$

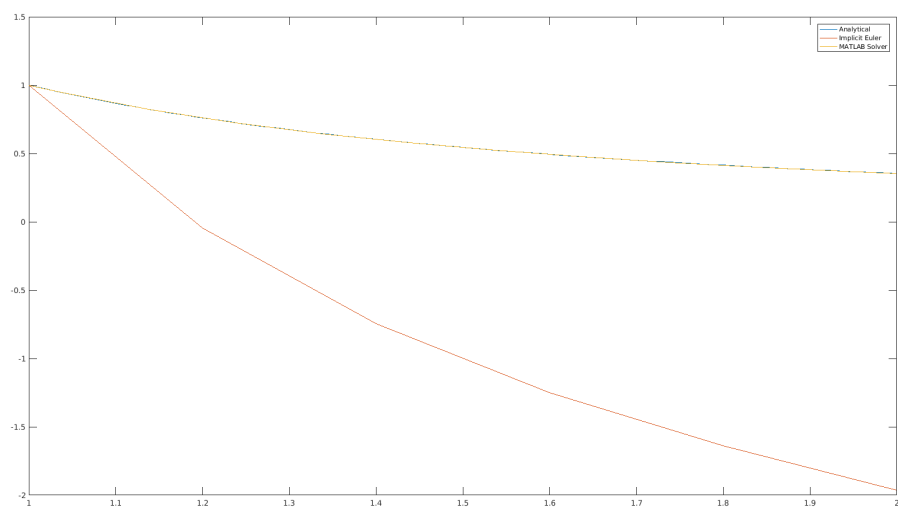
1.0000 -1.5000
0.9452 -1.3656

```

0.8231    -1.0847
0.7252    -0.8786
0.6452    -0.7234
0.5790    -0.6040
0.5234    -0.5105
0.4761    -0.4361
0.4355    -0.3760
0.4004    -0.3269
0.3698    -0.2863
0.3528    -0.2647

```

Current plot held
Current plot released



Question 2

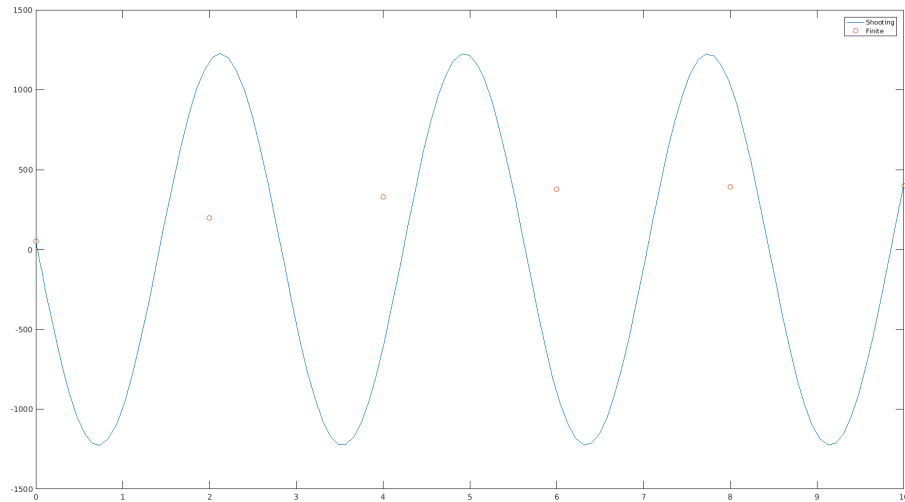
```

%a.
[x1,T1]=ode45(@d2Tdx2hw,[0 10],[50 0]);
TL1 = T1(end,1) ;
[x2,T2]=ode45(@d2Tdx2hw,[0 10],[50 10]);
TL2 = T2(end,1) ;
za = 0 + (10-0)/(TL2-TL1)*(400-TL1) ;
[x3,T3]=ode45(@d2Tdx2hw,[0 10],[50 za]);
TL3 = T3(end,1) ;
plot(x3,T3(:,1));
hold
%b.
dx = 2; x2b = 0:dx:10;
b = .1*x2b*2^2.*ones(1,6);
b(2) = b(2)+50; b(5) = b(5)-1.5*400;
b=[100.8000,1.6000,2.4000,-596.8000];
C = .5*ones(3,1); D = -2*ones(4,1); E = 1.5*ones(3,1);
A = gallery('tridiag',C,D,E);
T = A\b';

```

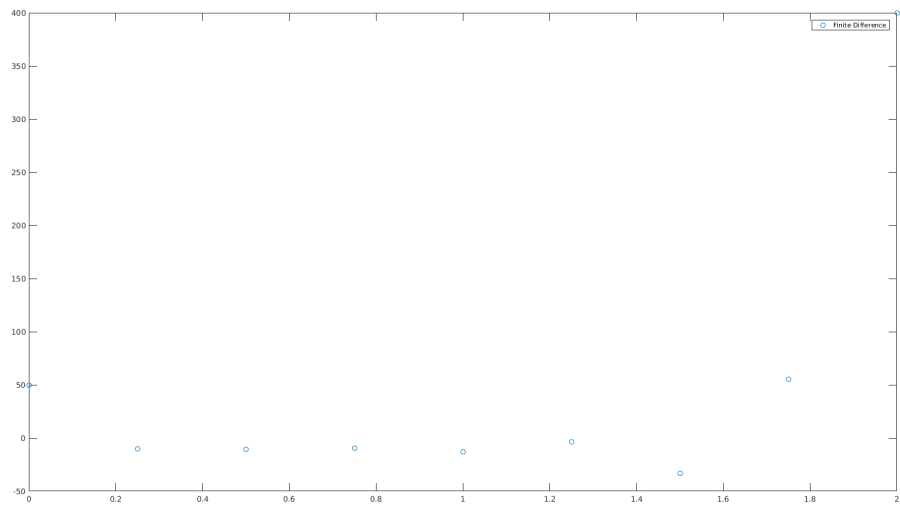
```
T = [50;T;400];
plot(x2b,T,'o')
legend('Shooting','Finite')
hold
```

Current plot held
Current plot released



Question 3

```
%a.
% fzero(@res,10) not sure why this doesn't work.
% Get this error:
%
% Error using fzero (line 301)
% FZERO cannot continue because user-supplied function_handle ==> res
% failed with the error below.
%
% D2YDX2HW returns a vector of length 3, but the length of initial
% conditions vector is 2. The vector returned by D2YDX2HW
% and the initial conditions vector must have the same number of
% elements.
%
% Error in hw6 (line 48)
% fzero(@res,10)
%b.
x = 0:.25:2;
b = 10*.25^2*ones(7,1);
b(1) = b(1)+30; b(end) = b(end)-3*70;
A = gallery('tridiag',3*ones(6,1),-2*ones(7,1),-1*ones(6,1));
T = A\b;
T = [50,T',400];
plot(x,T,'o')
legend('Finite Difference')
```



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