Table of Contents


```
%Homework 5/1
```

Context Example

```
%Variables given
s=[55 80 105 130 155 180 205 230 255 280 305 330 355 380 405 430 455
 480 505 543];
o=[52.5 88 87 78.5 69.5 59 50.5 52.5 65 78 79.5 69 58.5 50 40.5 29.5
 27 46 68 71];

area=trapz(s,o)
```

```
area =

                    29847.25
```

Numerical Integration Problem 1

```
clear
clc

%Define x vector
x=[-1:0.1:1];

%Define equation of y
y=x.^3 +2*x.^2-x+3;

trapint=trapz(x,y) %Integral using trapz
quadint=quad('x.^3 +2*x.^2-x+3',-1,1) %Integral using quad
quadlint=quadl('x.^3 +2*x.^2-x+3',-1,1) %Integral using quadl
```

```
trapint =

                      7.34


quadint =

           7.33333333333333
```

```
quadlint =

           7.33333333333333
```

Numerical Integration Problem 2

```
clear
clc

%Define dydt from given information
dydt=@(t,y) t.^2+y;
%Solve from 0 to 1 using ode45
[t1,y1]=ode45(dydt,[0,1],0);
%Display results in table
table=[t1 y1]


table =

                         0                         0
                     0.025      5.24251652126733e-06
                      0.05      4.21926330902778e-05
                     0.075      0.000143300151972657
                       0.1      0.000341836144444445
                     0.125      0.000671908307753048
                      0.15       0.00116848632383706
                     0.175       0.00186743202629946
                       0.2       0.00280551636011964
                     0.225       0.00402043539413676
                      0.25       0.00555083538968605
                     0.275       0.00743634905817696
                       0.3       0.00971761530322372
                     0.325        0.0124362959575928
                      0.35        0.0156351005312476
                     0.375        0.0193578292000859
                       0.4        0.0236493956231183
                     0.425        0.0285558444800729
                      0.45        0.0341243758651307
                     0.475        0.0404033957147452
                       0.5        0.0474425420232744
                     0.525        0.0552927032654475
                      0.55        0.0640060423985295
                     0.575        0.0736360555115966
                       0.6         0.084237601797041
                     0.625         0.095866922950962
                      0.65         0.108581666742576
                     0.675         0.122440954749609
                       0.7         0.137505416480678
                     0.725          0.15383720985646
                      0.75         0.171500044300835
                     0.775         0.190559258517982
```

```
   0.8          0.211081859202203
 0.825          0.233136542713524
  0.85          0.256793717640272
 0.875          0.282125593673983
   0.9          0.309206225389117
 0.925          0.338111535238718
  0.95          0.368919335532841
 0.975          0.401709429578426
     1          0.436563661062119
```

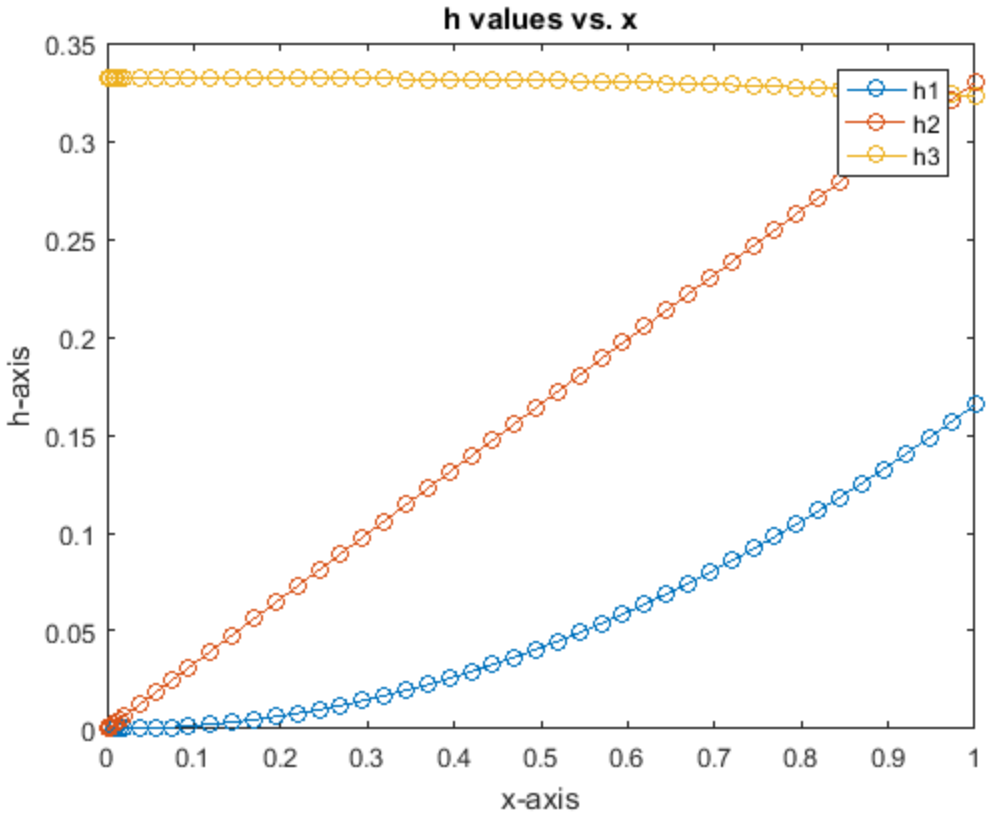
Numerical Integration Problem 3

```
clear
clc

%Solve using ode, calling user-created function to solve for x= 0 to 1
 and
%h1=0, h2=0, and h3= 0.332 when x=0
[x,h]=ode45(@threeeqs,[0,1],[0,0,0.332]);
%Create plot using ode45 again, but without assigning values
ode45(@threeeqs,[0,1],[0 0 0.332]);
%Label plot
title('h values vs. x'),xlabel('x-axis'),ylabel('h-
axis'),legend('h1','h2','h3')

%Create table of values
sol=table(h(:,1),h(:,2),h(:,3));
%Name the variables in the table
sol.Properties.VariableNames={'h1','h2','h3'}
```

```
sol =
```

h1	h2	h3
0	0	0.332
3.80094785831276e-09	5.02377286301904e-05	0.331999999999968
1.52037914332542e-08	0.000100475457260364	0.331999999999745
3.42085307248198e-08	0.000150713185890477	0.331999999999141
6.08151657329933e-08	0.000200950914520458	0.331999999997963
3.07876776516193e-07	0.000452139557663825	0.331999999976799
7.44985780202743e-07	0.000703328200776432	0.331999999912672
1.37214217675821e-06	0.000954516843816742	0.331999999781711
2.18934596609898e-06	0.00120570548672516	0.331999999560049
9.1260757815091e-06	0.00246164869593895	0.331999996255801
2.0813990368507e-05	0.00371759188253233	0.33199998710368
3.72530896032347e-05	0.00497353501873958	0.331999969120076
5.84433732012908e-05	0.00622947806550811	0.331999939321384
0.000235662483249309	0.0125091898009512	0.331999508675742
0.000531661044849618	0.0187888869525299	0.331998335113549
0.000946438660380506	0.0250685519410547	0.331996045699924

0.00147999442624979	0.0313481601337184	0.331992267519451
0.00236744508238965	0.0396478756030006	0.331984356126683
0.00346238586345963	0.0479473436666094	0.331972331755202
0.00476480934411454	0.0562464507435878	0.331955333920872
0.00627470455987624	0.0645450617482333	0.331932502549003
0.00799205691818091	0.0728430200991064	0.331902978096968
0.00991684836078017	0.0811401477234305	0.331865901746516
0.0120490558052586	0.0894362451008932	0.331820415701913
0.0143886504824533	0.0977310912857891	0.331765663347838
0.0169355978494194	0.106024443929586	0.331700789434517
0.0196898577538336	0.114316039303139	0.331624940380554
0.0226513828810573	0.122605592384076	0.331537264712304
0.0258201180946565	0.13089279690108	0.331436913294523
0.0291960003529563	0.139177325375803	0.33132303957666
0.032778958877249	0.147458829172705	0.331194800004361
0.0365689136098843	0.155736938645115	0.331051354595542
0.040565774560783	0.164011263209208	0.330891867241537
0.0447694417296724	0.172281391410861	0.330715506012032
0.0491798052804476	0.180546891012705	0.330521443671536
0.0537967440176781	0.188807309213319	0.330308858384648
0.0586201247428914	0.19706217275813	0.330076934083924
0.0636498021849826	0.205310988036497	0.329824860829471
0.0688856191835946	0.21355324121515	0.329551835424218
0.0743274051932564	0.22178839854399	0.329257062237233
0.0799749756540455	0.230015906510621	0.328939753632673
0.0858281319330282	0.238235191972475	0.32859913037831
0.0918866615200132	0.246445662345207	0.328234422350421
0.098150336570221	0.254646706007114	0.327844869459847
0.104618913294697	0.262837692503281	0.327429722134237
0.111292131915954	0.271017972716957	0.326988241767794
0.118169716879893	0.279186879120518	0.326519701503176
0.125251375449397	0.287343726288631	0.326023387240404
0.132536797120528	0.295487811157032	0.325498598162276
0.140449310707925	0.304071468029296	0.324912879620469
0.148588176339663	0.312639227476194	0.324293864918879
0.156952962909742	0.321190200486197	0.323640782735641
0.165543215056413	0.329723478033649	0.322952882019916



Published with MATLAB® R2016b