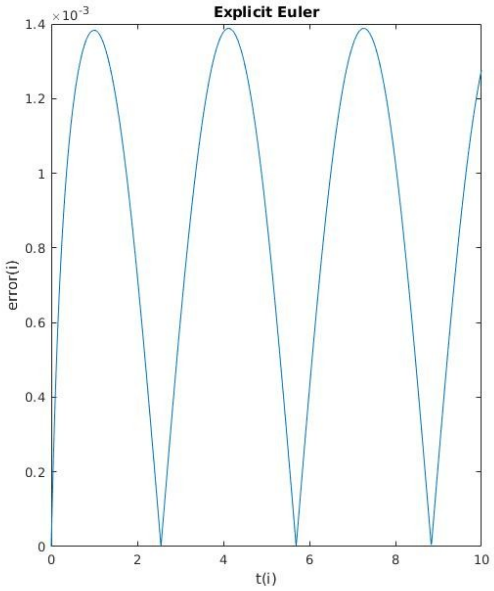
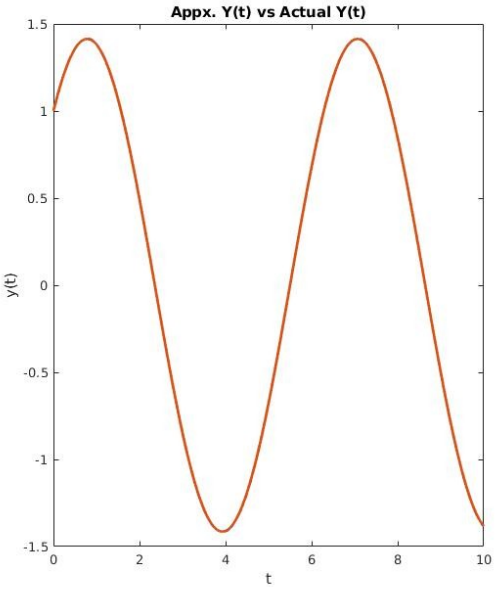
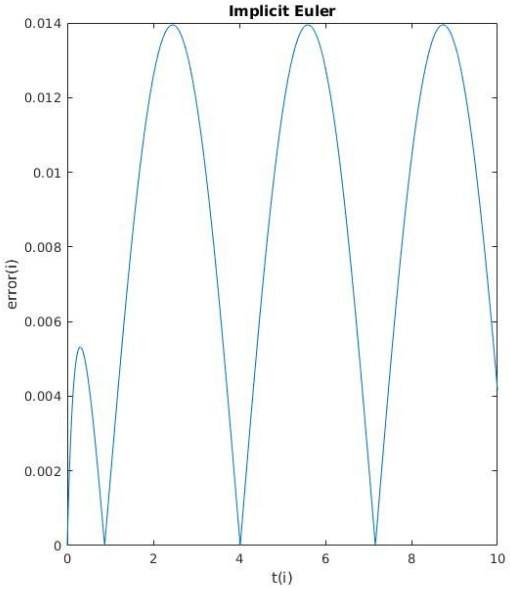
Lab 7 Output

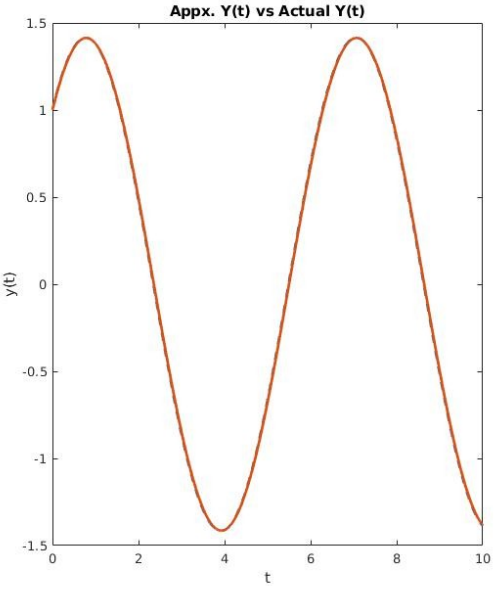
Q1.

lambda = -5, h = 0.01

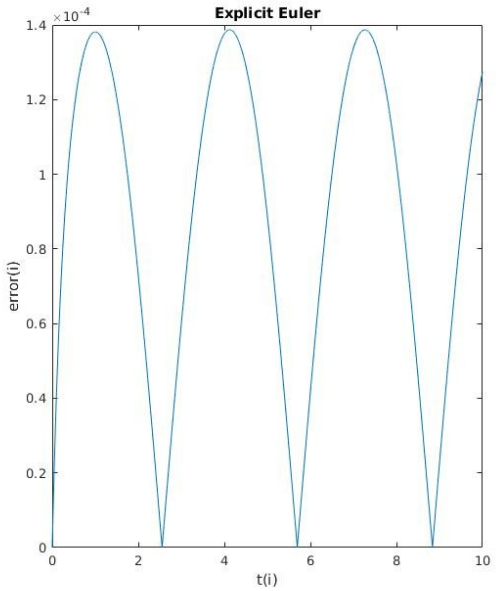


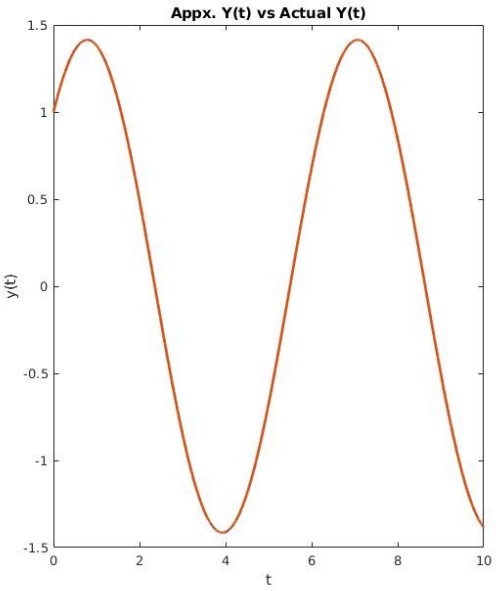


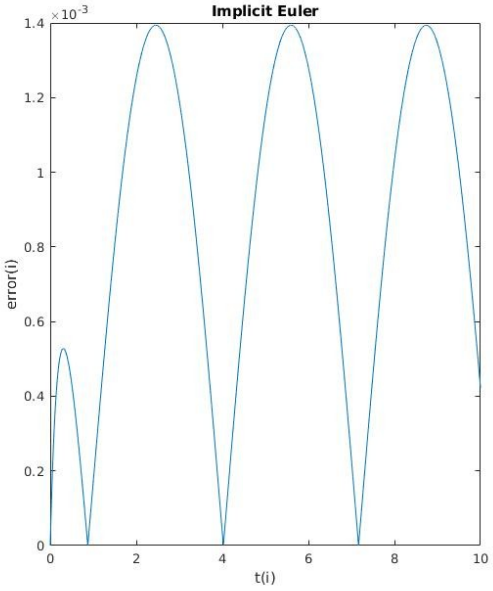


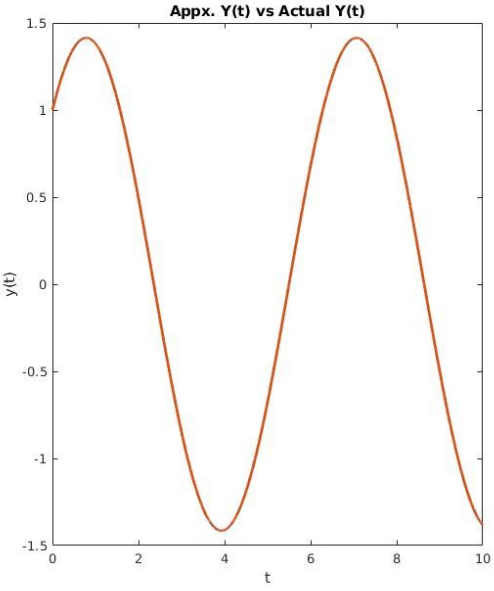


lambda = -5, h= 0.001

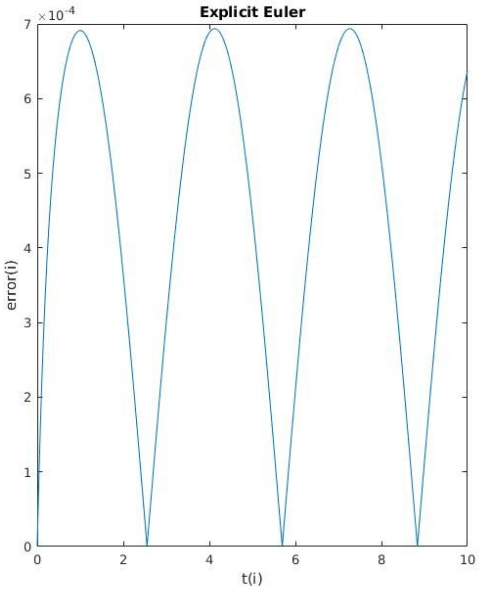


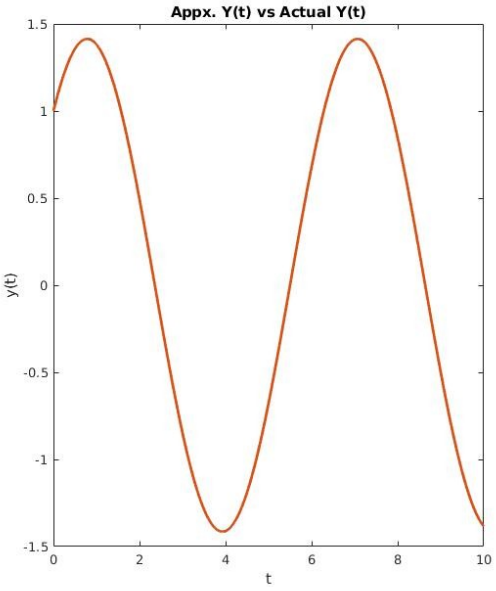


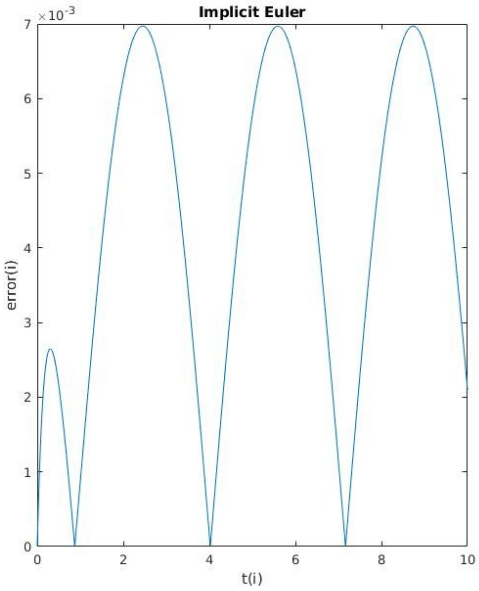


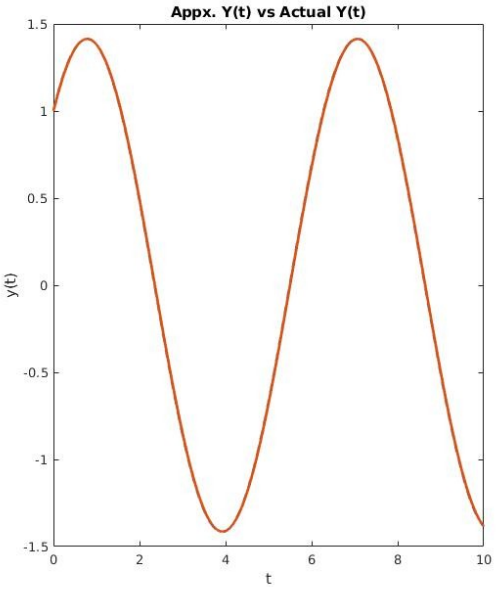


lambda = -5, h= 0.005

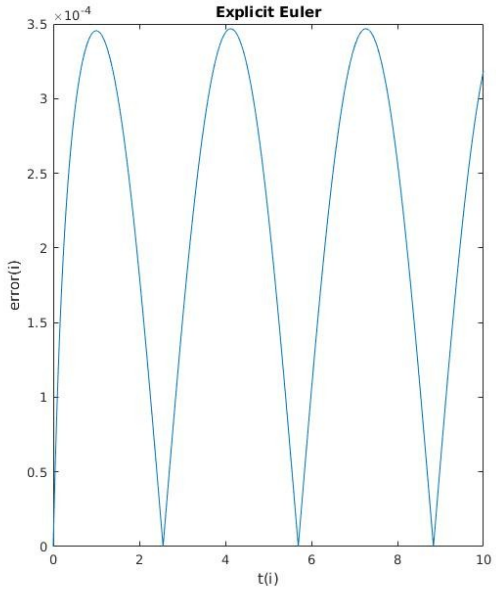


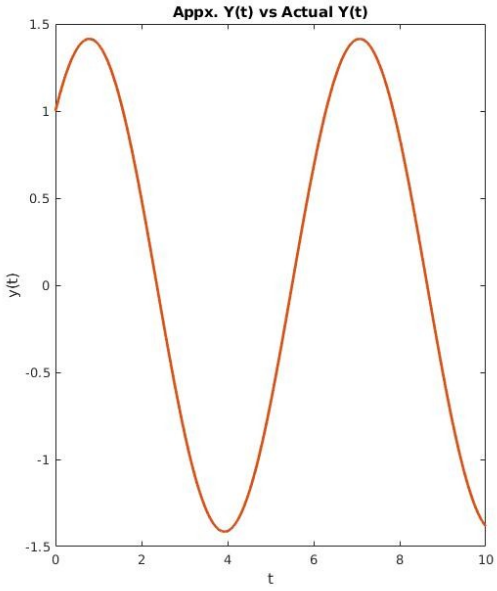


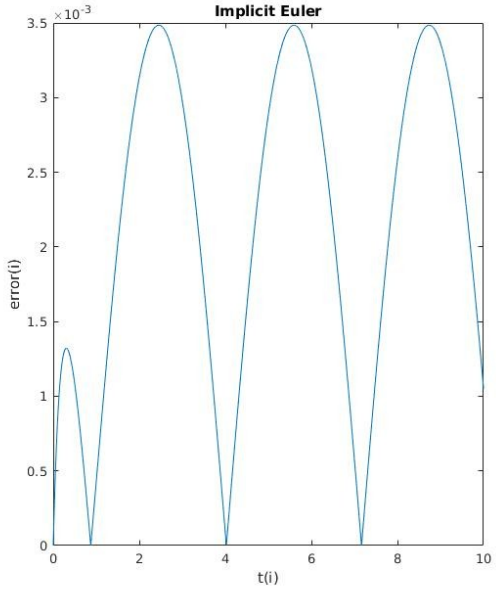


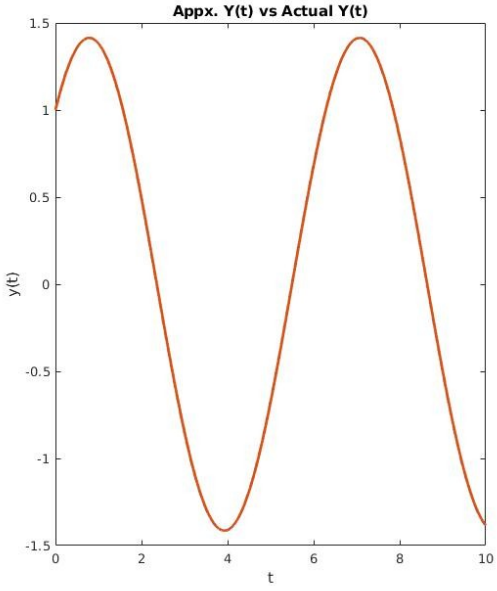


lambda = -5, h= 0.0025

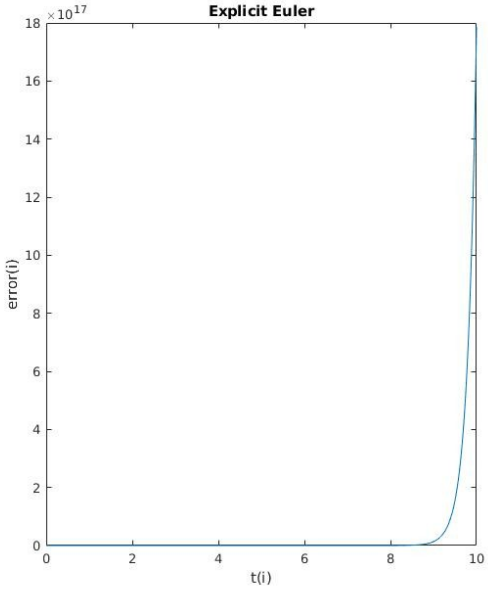


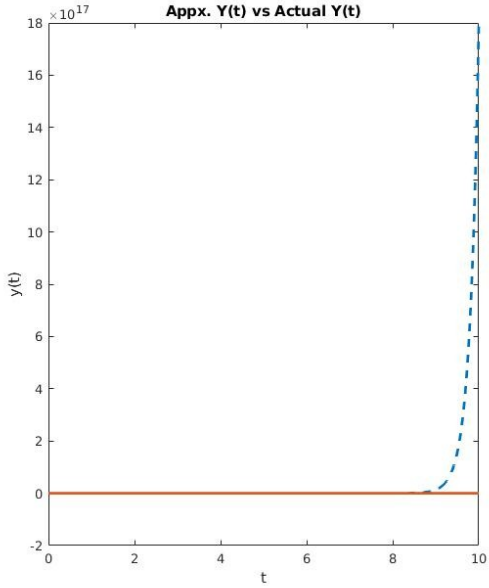


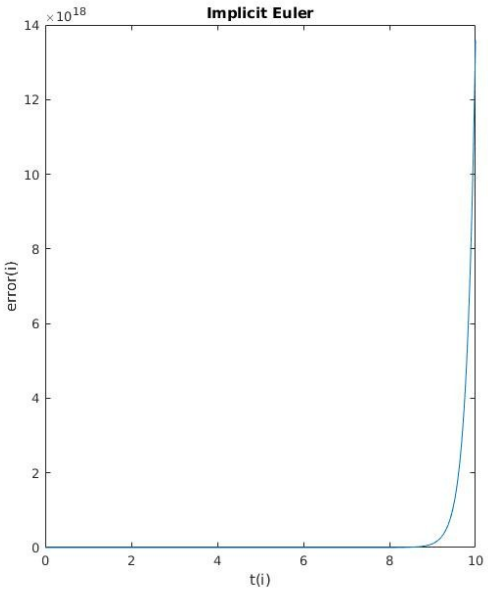


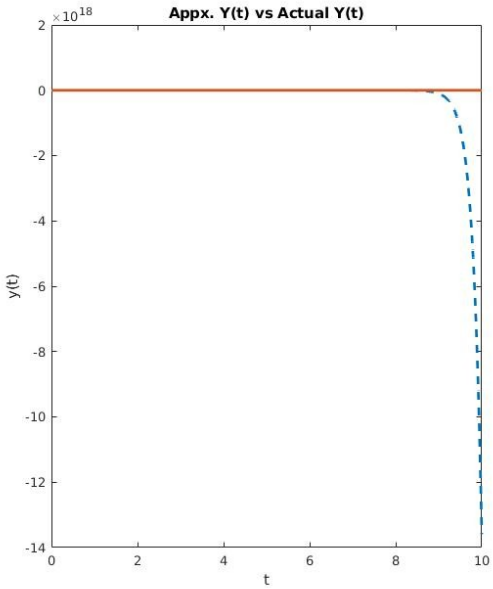


lambda = 5, h= 0.01

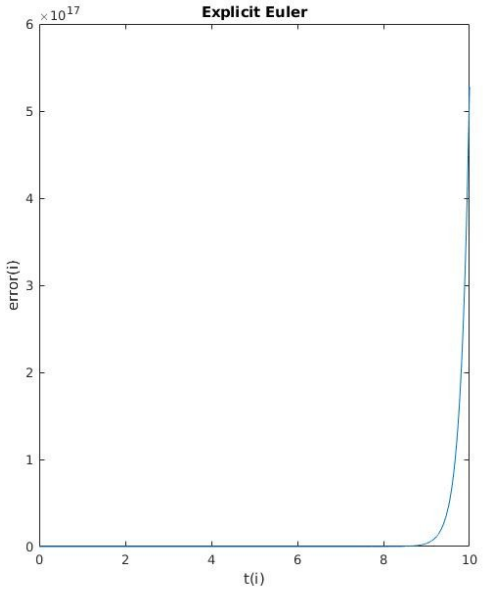


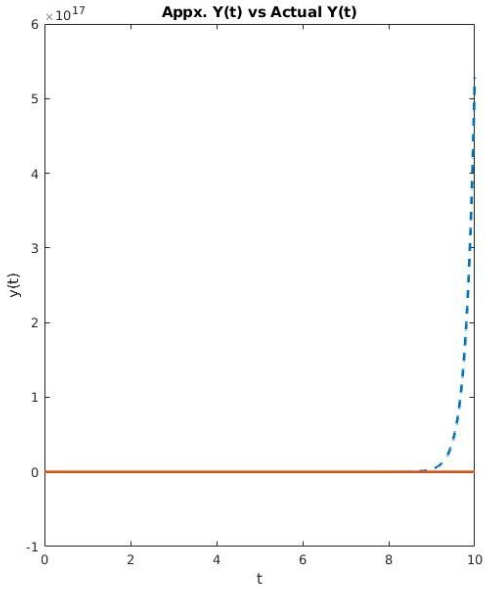


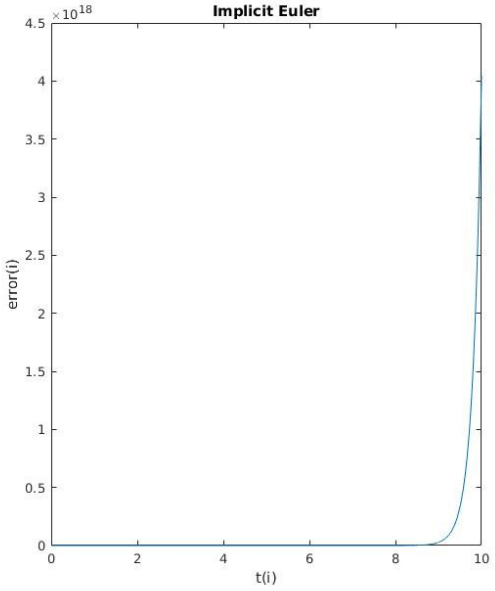


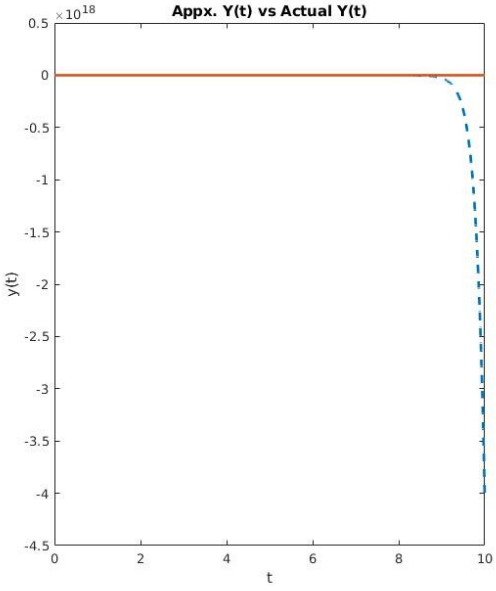


lambda = 5, h= 0.001









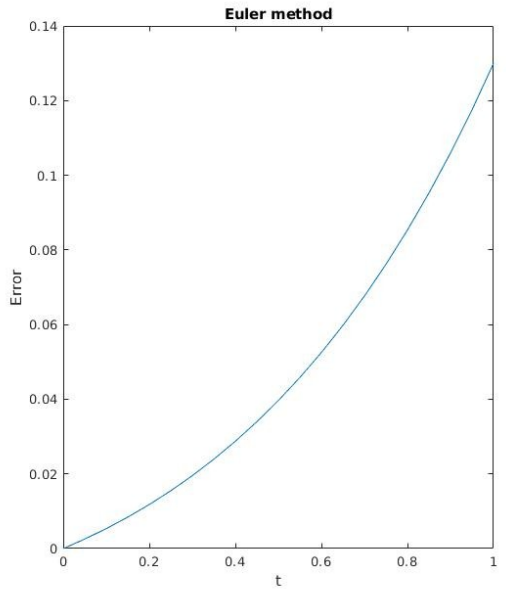
Q2.

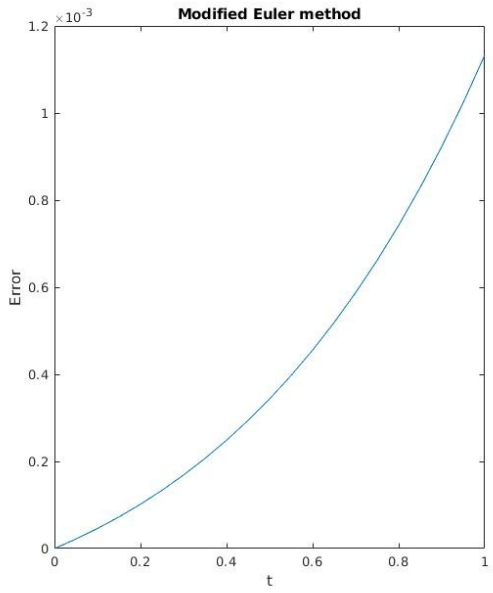
h = 0.050000

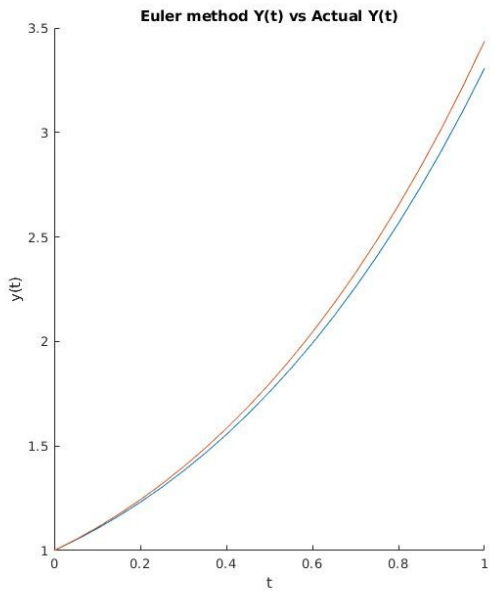
Euler method gives y(1) = 3.306595

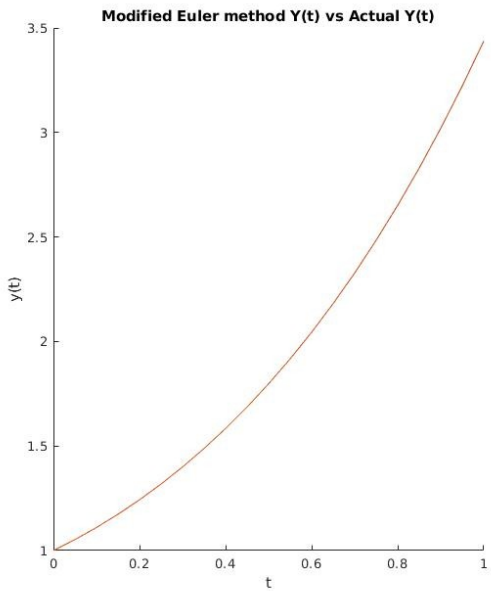
Modified Euler method gives y(1) = 3.437697

Actual solution gives y(1) = 3.436564







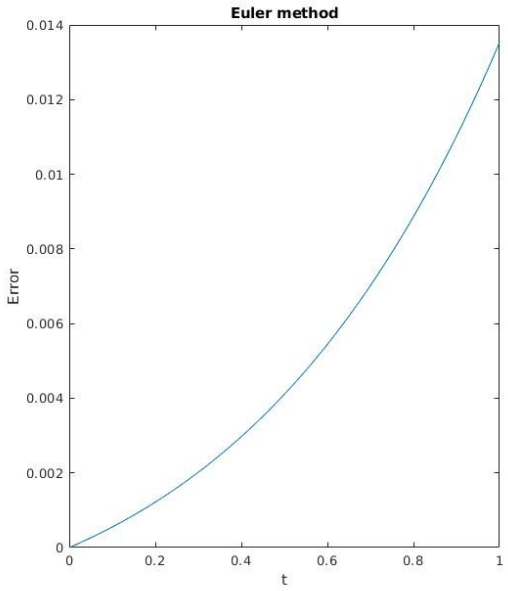


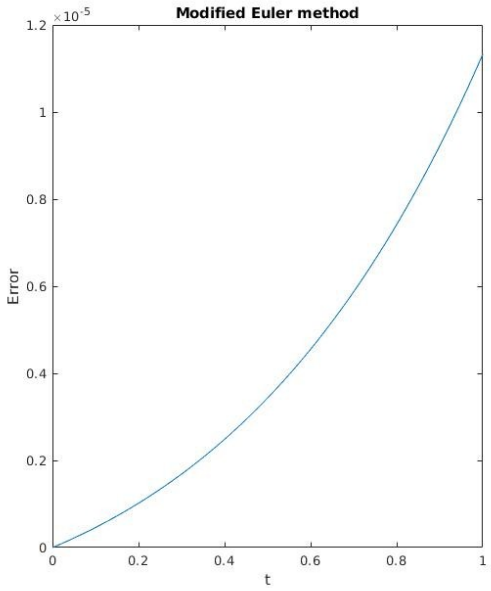
h = 0.005000

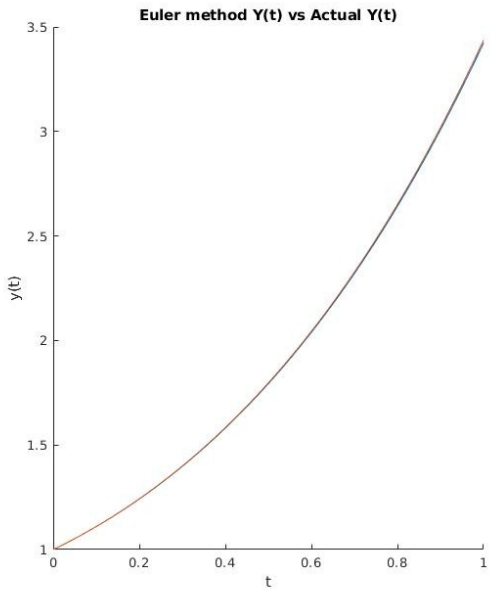
Euler method gives y(1) = 3.423034

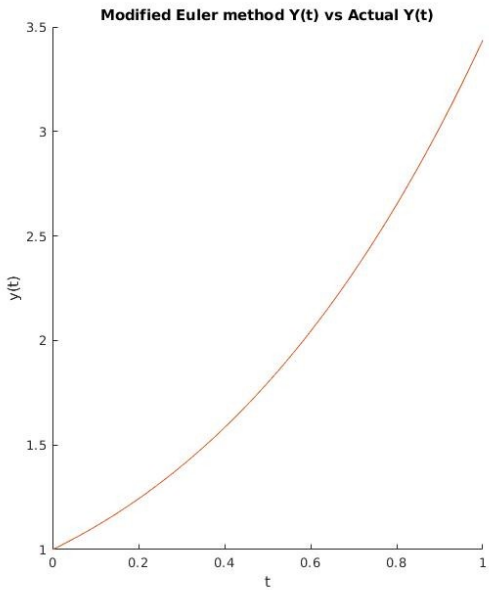
Modified Euler method gives y(1) = 3.436575

Actual solution gives y(1) = 3.436564



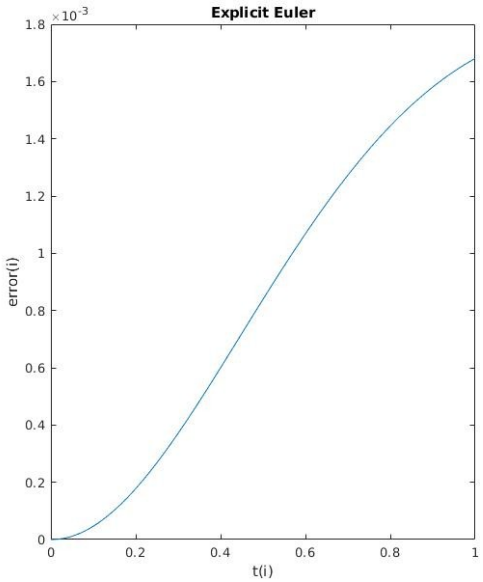


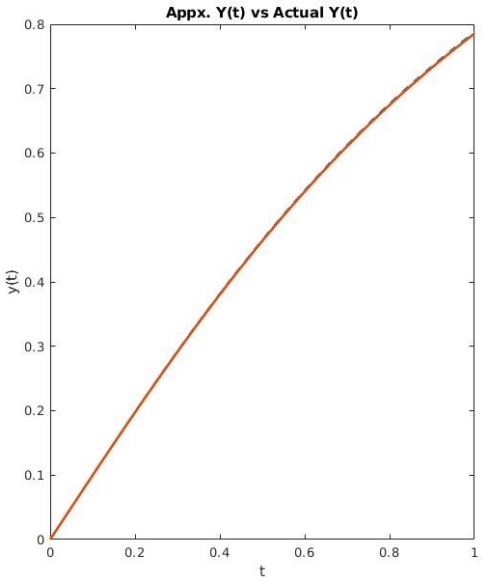


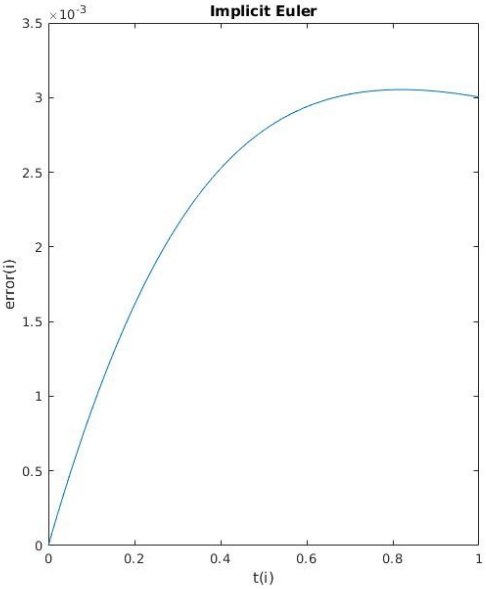


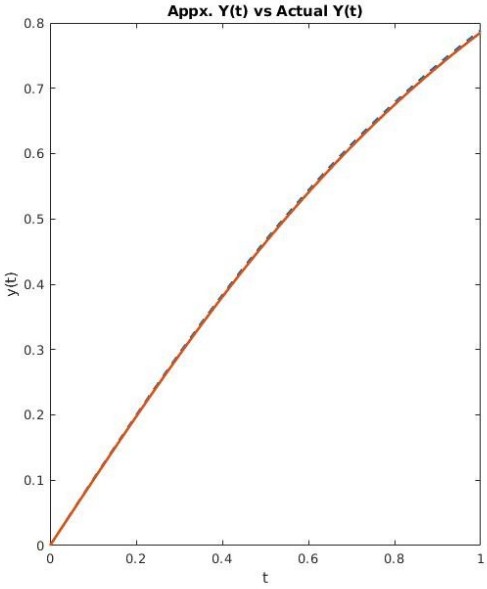
Q3.

(a)lambda = -1.000000 h = 0.010000

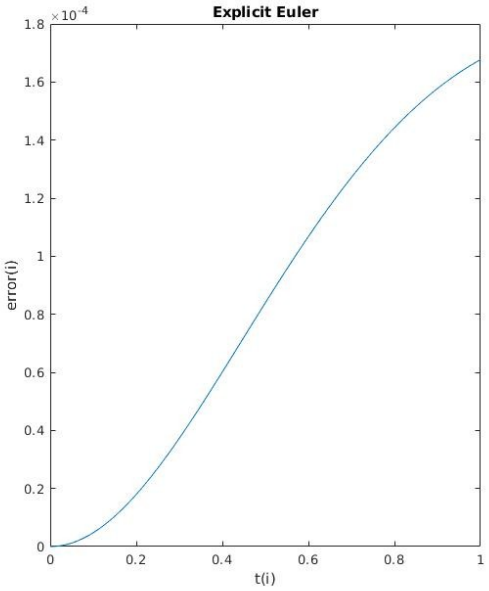


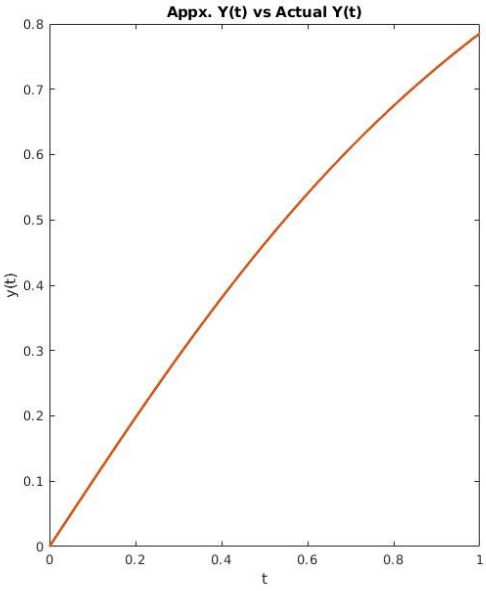


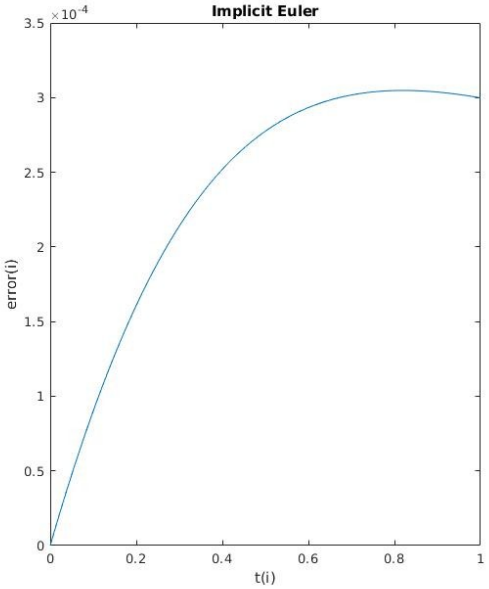


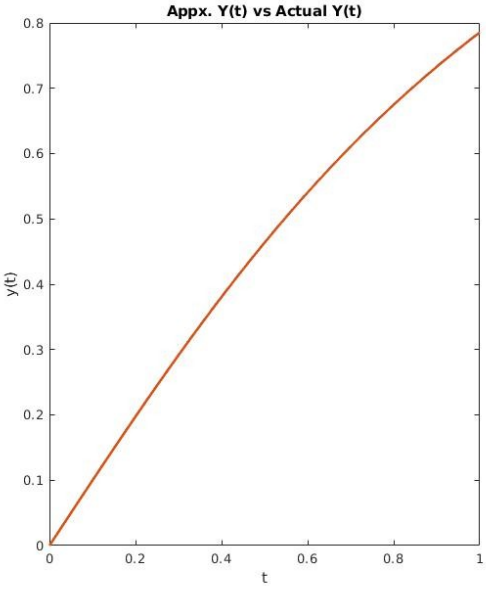


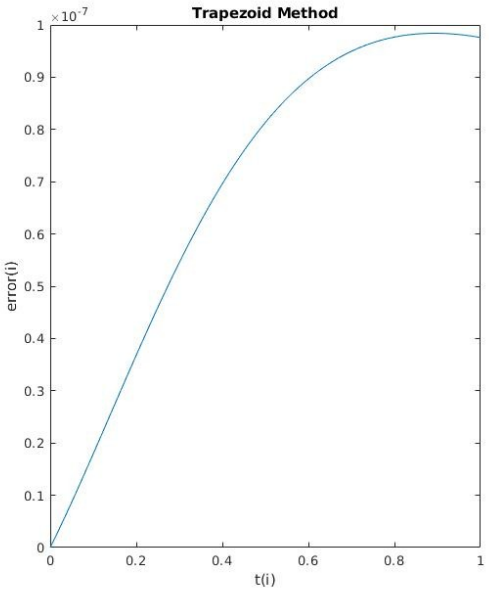
(b)lambda = -1.000000 h = 0.001000

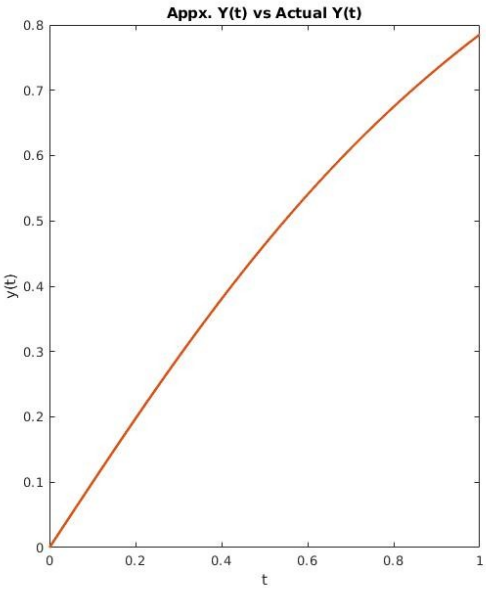




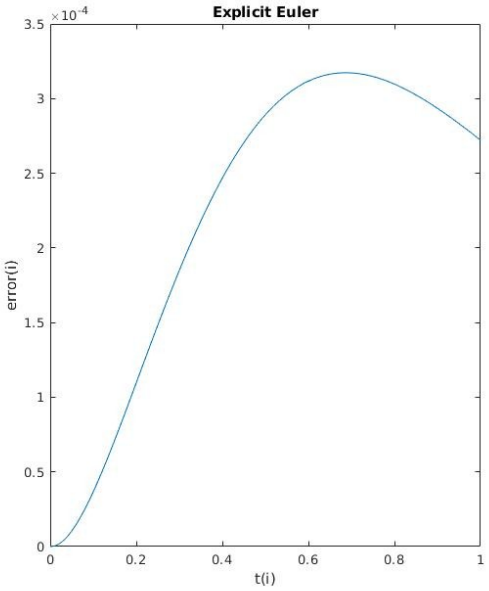


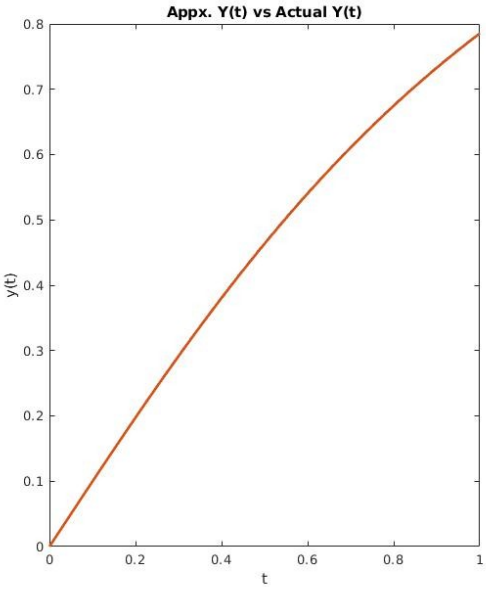


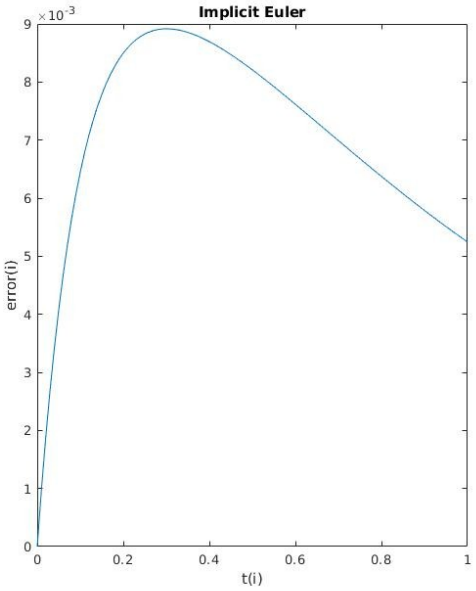


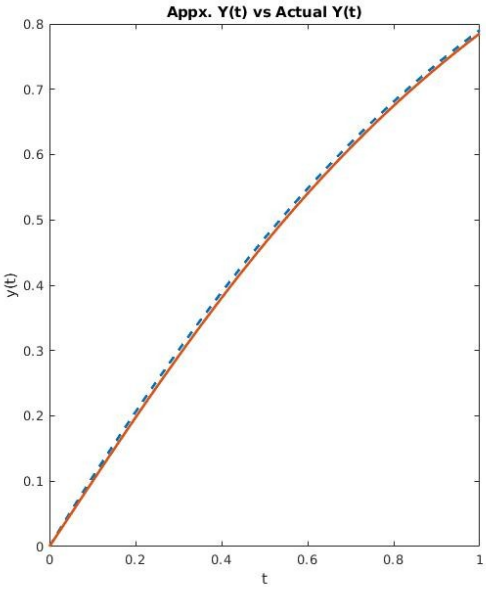


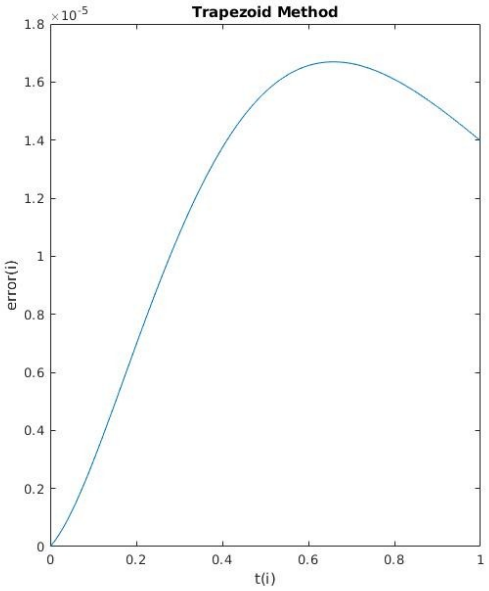
(c)lambda = -10.000000 h = 0.010000

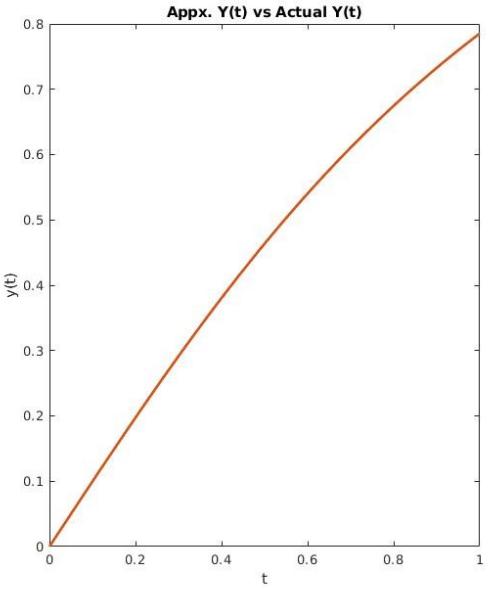




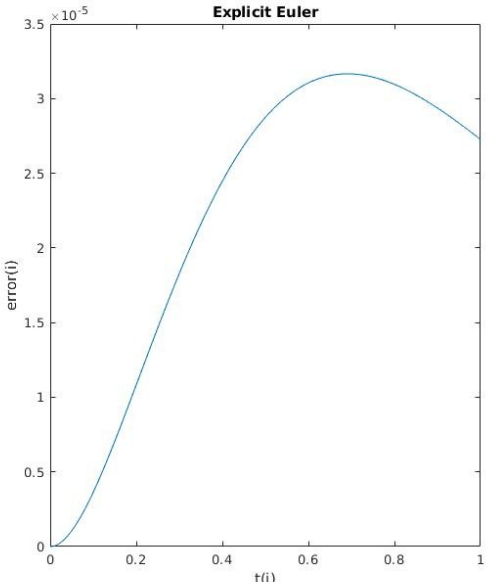


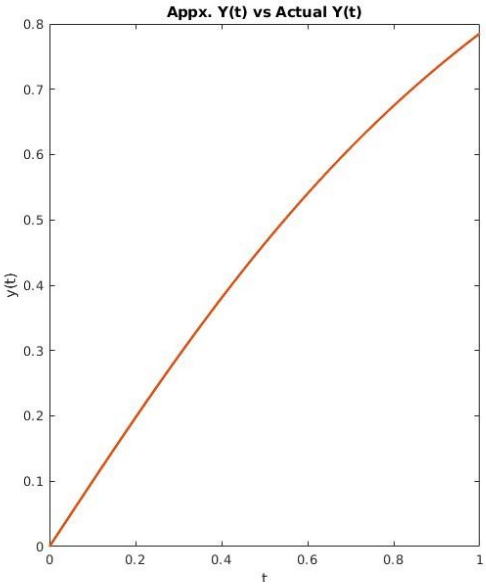


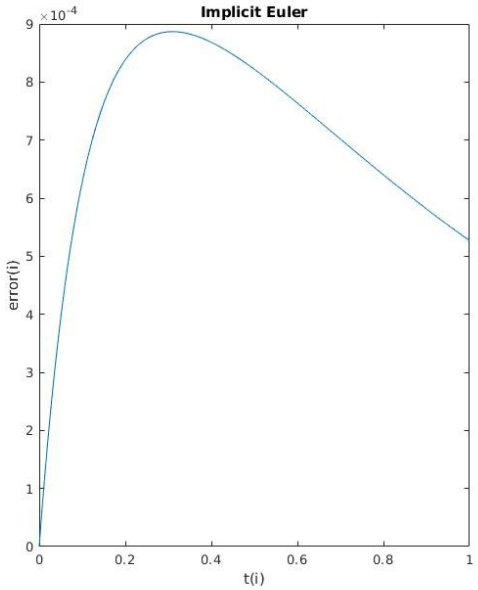


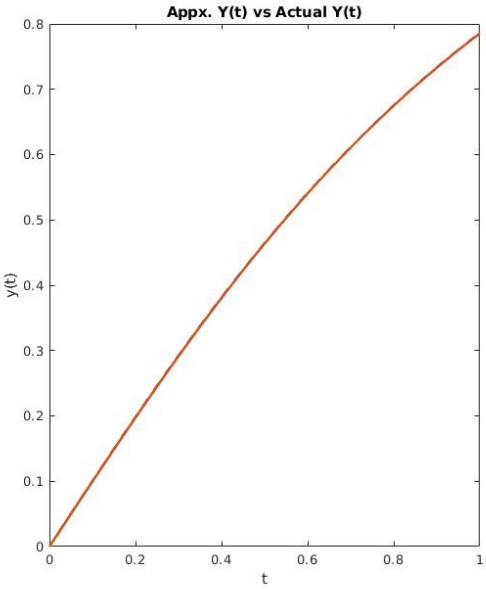


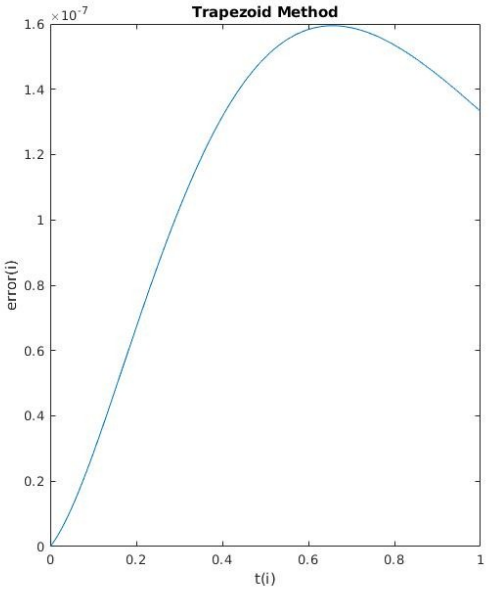
(d)lambda = -10.000000 h = 0.010000

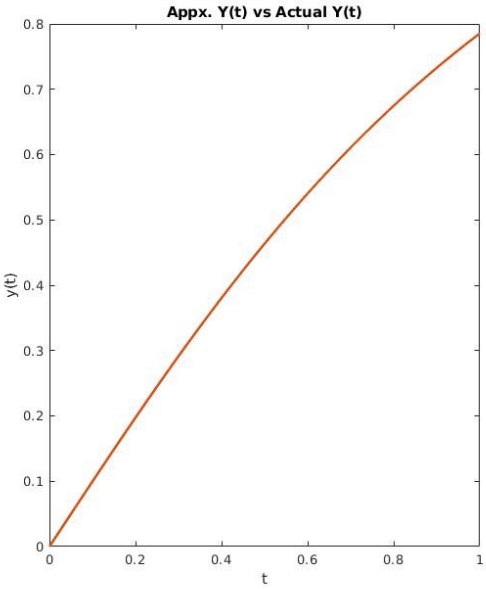




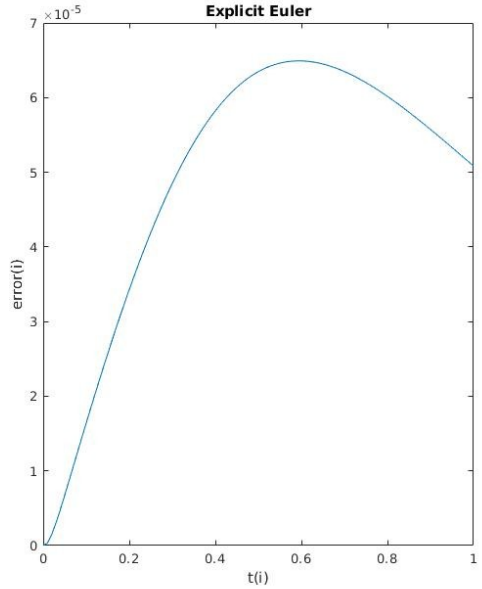


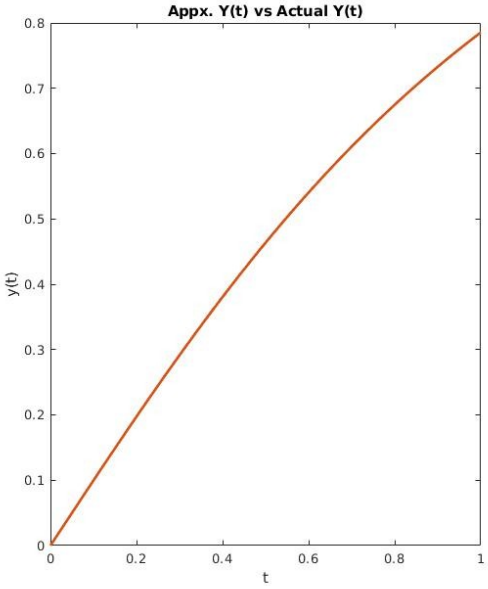


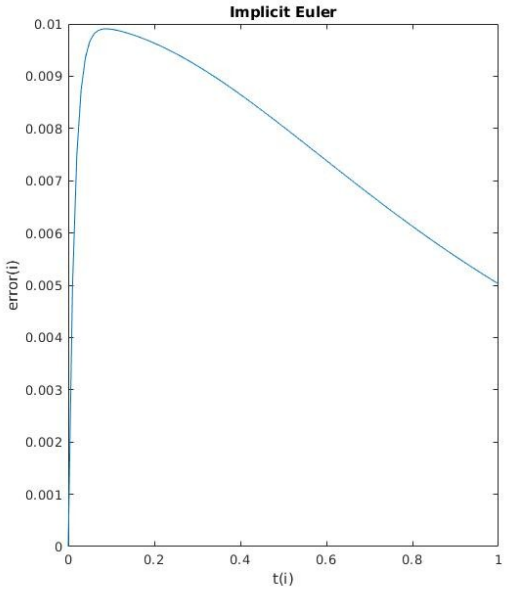


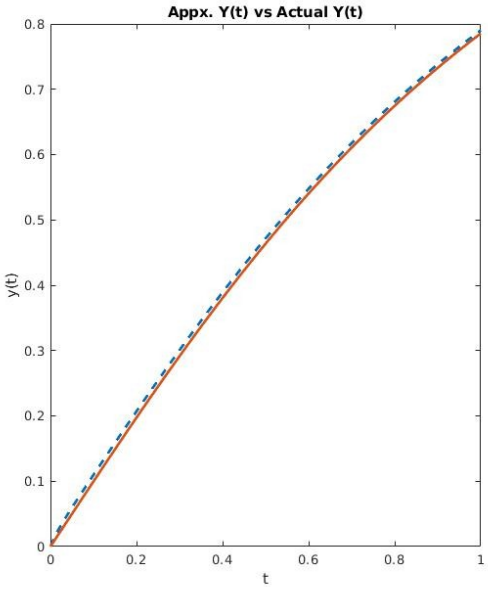


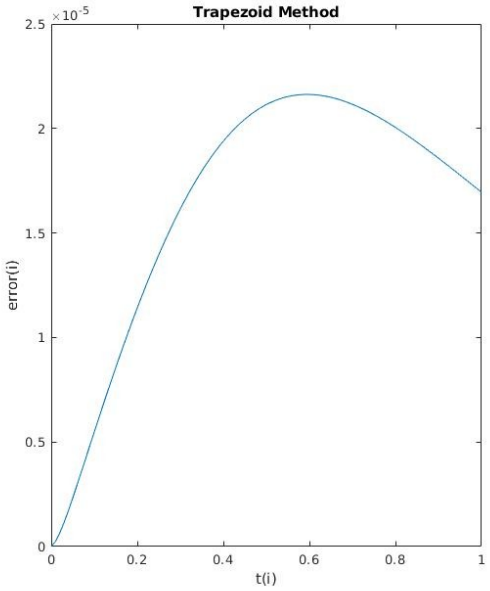
(e)lambda = -50.000000 h = 0.010000

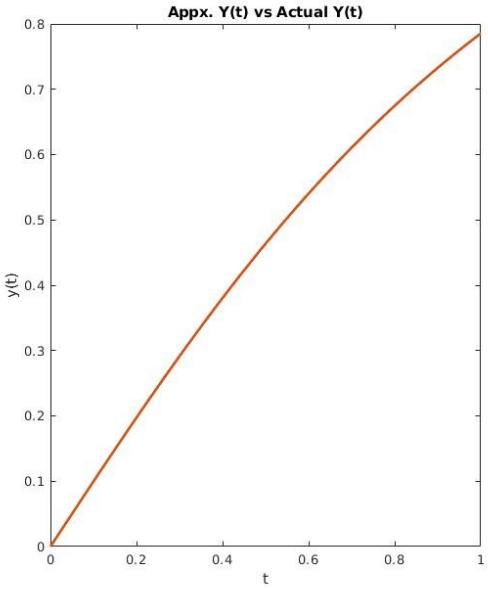




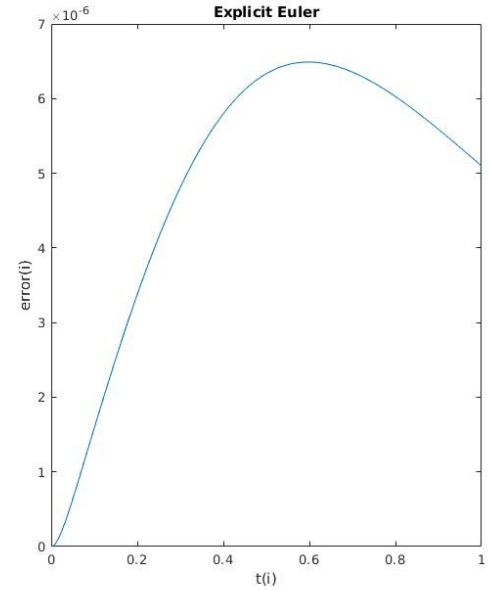


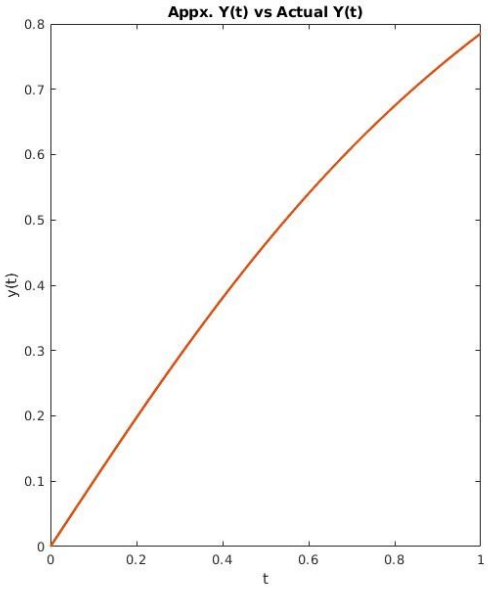


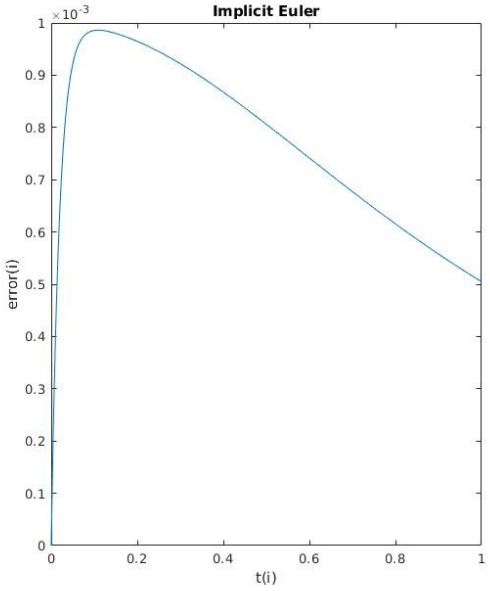


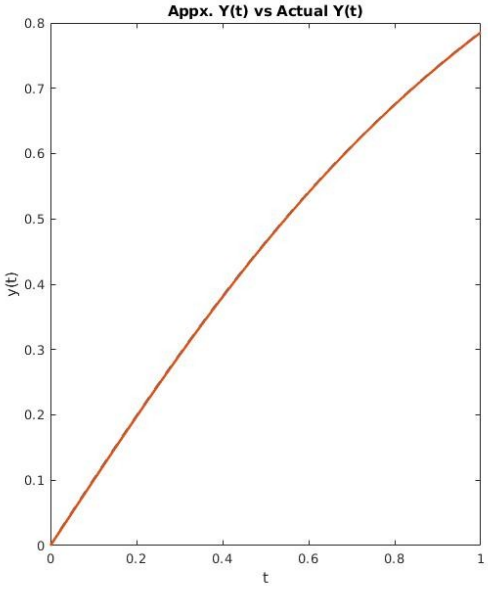


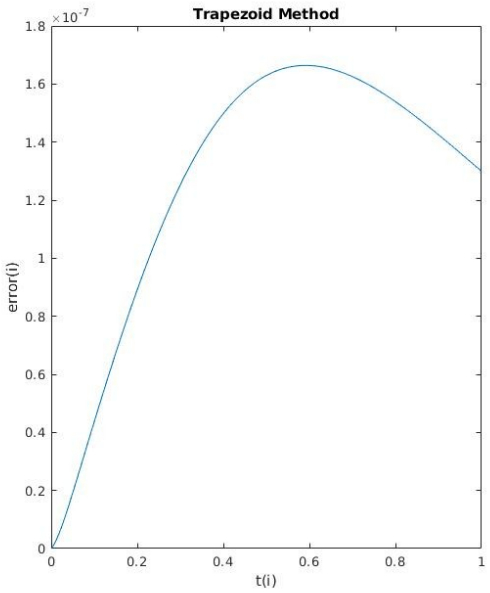
(f) lambda = -50.000000 h = 0.001000

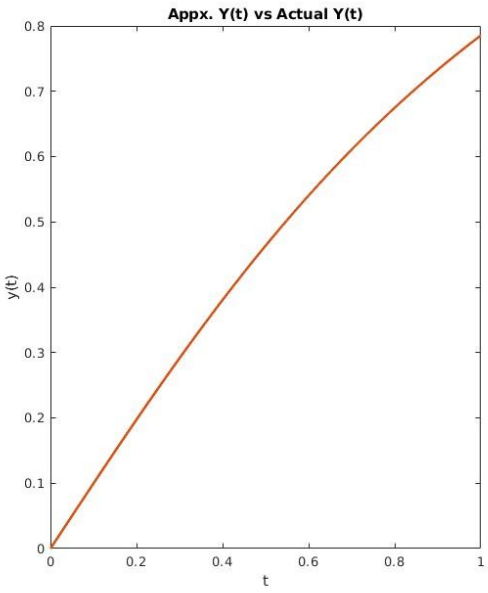




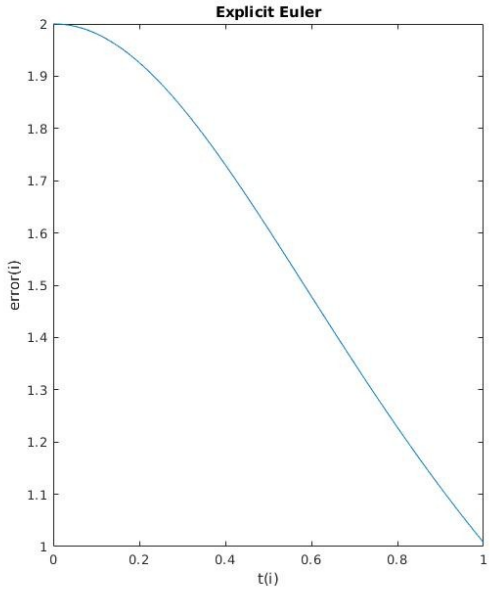


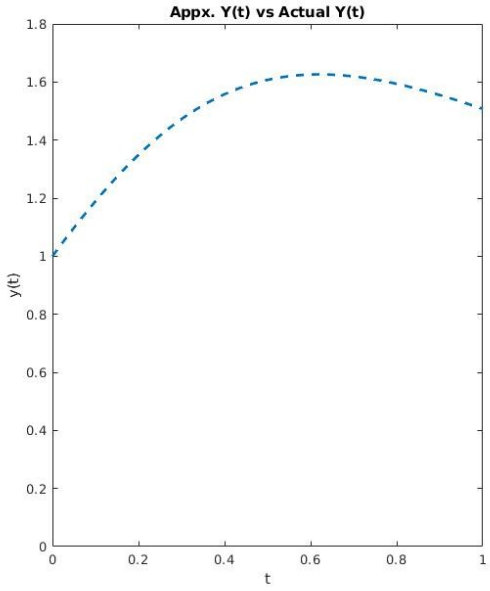


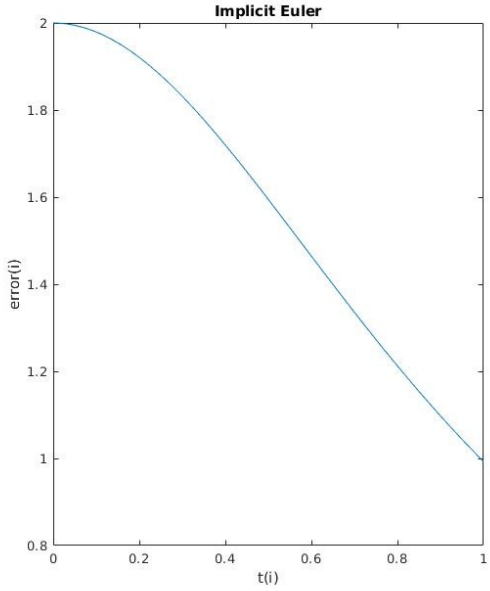


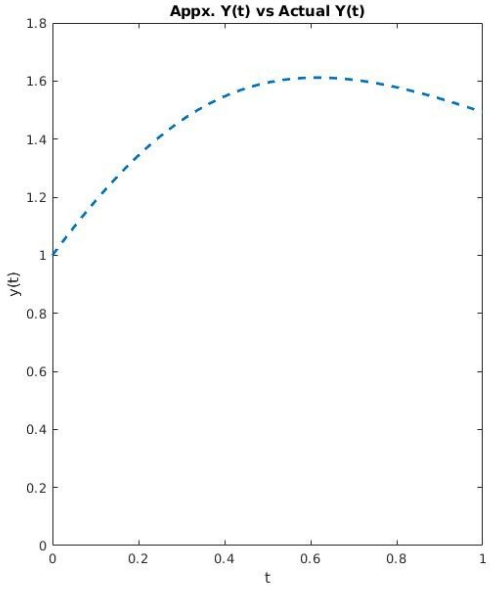


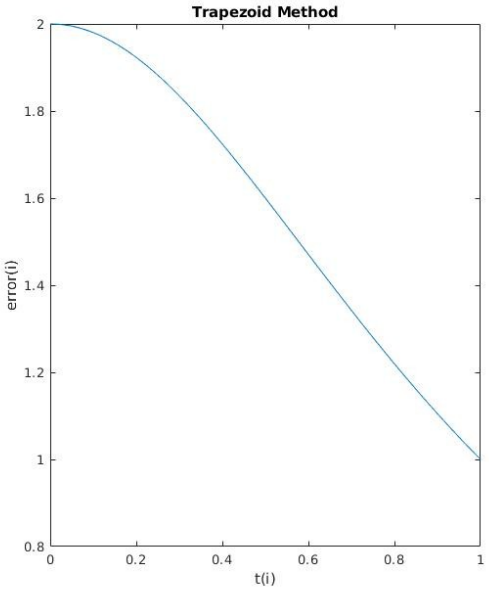
Q4.
a)

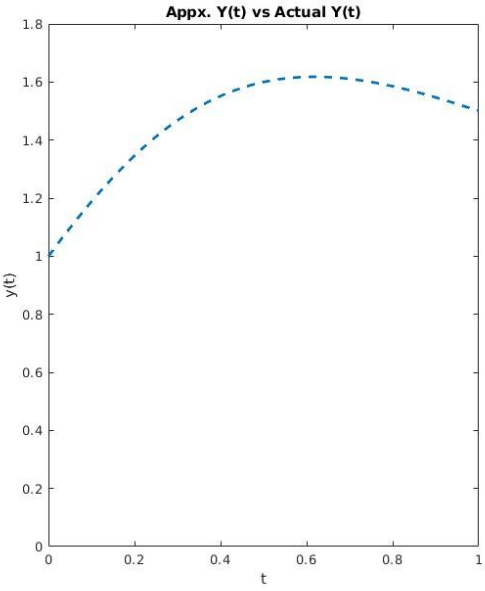

Explicit Euler
error(i)
t(i)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0
0.2
0.4
0.6
0.8
1

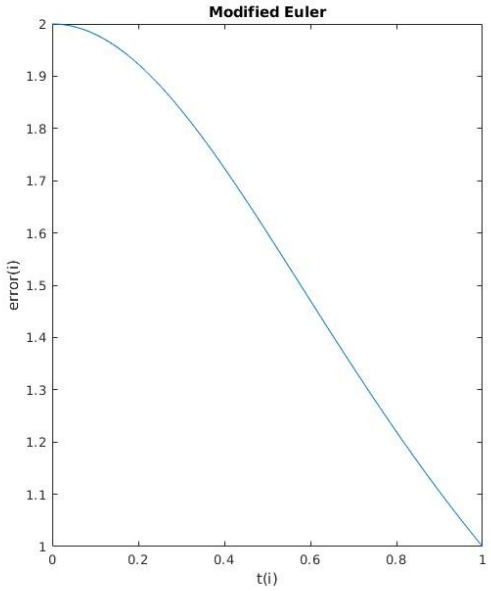

Appx. Y(t) vs Actual Y(t)
y(t)
t
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1

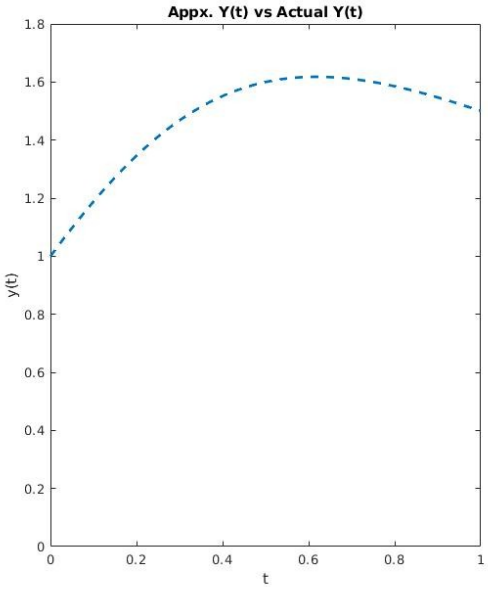

Implicit Euler
error(i)
t(i)
2
1.8
1.6
1.4
1.2
1
0.8
0
0.2
0.4
0.6
0.8
1


Appx. Y(t) vs Actual Y(t)
y(t)
t
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1

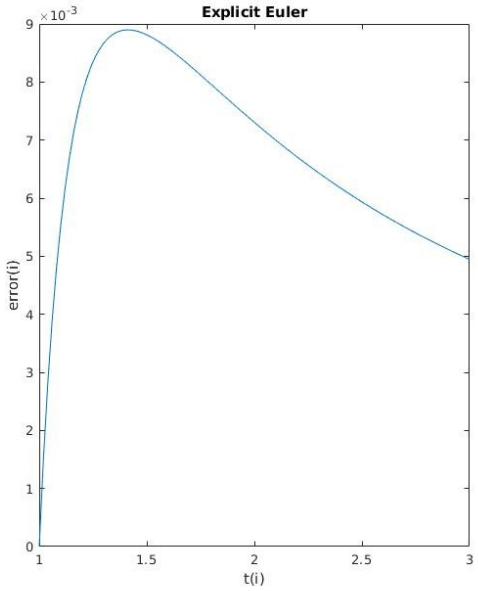

Trapezoid Method
error(i)
t(i)
2
1.8
1.6
1.4
1.2
1
0.8
0
0.2
0.4
0.6
0.8
1

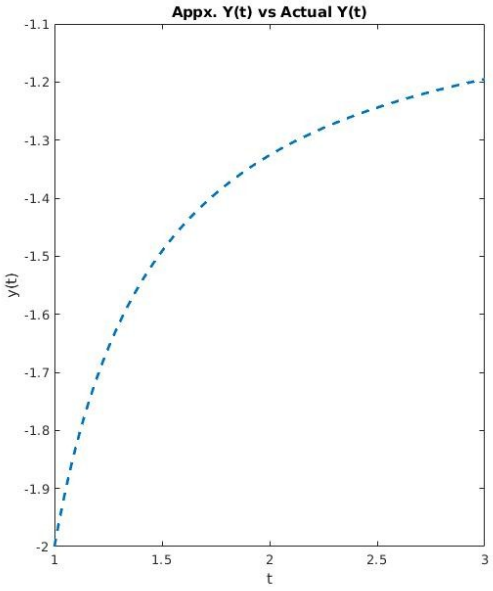

Appx. Y(t) vs Actual Y(t)
y(t)
t
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1

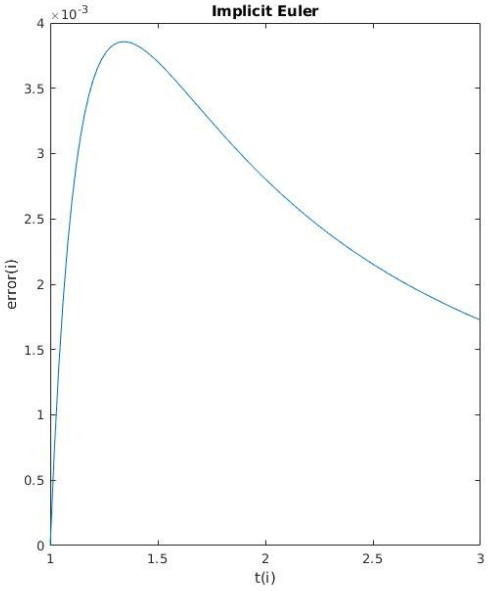

Modified Euler
error(i)
t(i)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0
0.2
0.4
0.6
0.8
1

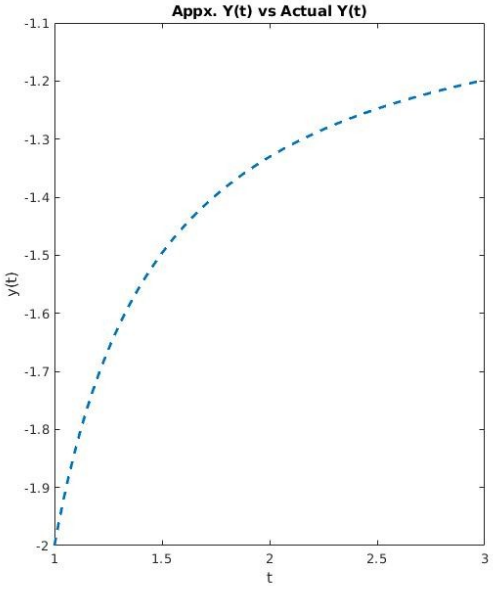

Appx. Y(t) vs Actual Y(t)
y(t)
t
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.4
0.6
0.8
1

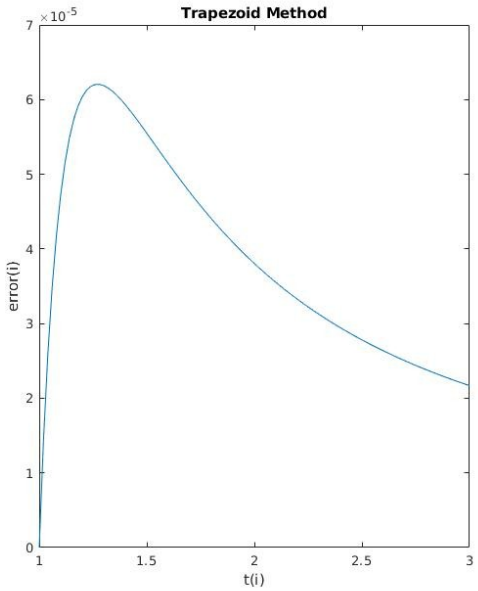
b)

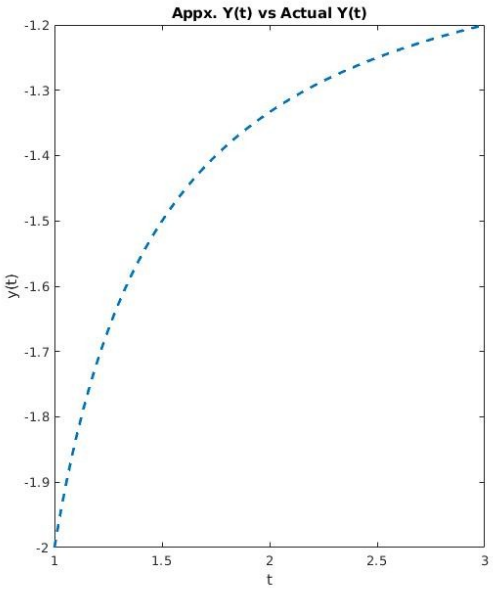

Explicit Euler
×10^-3
error(i)
t(i)

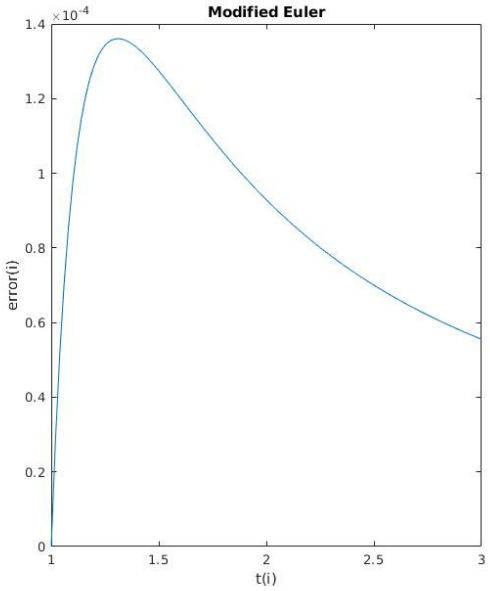

Appx. Y(t) vs Actual Y(t)
y(t)
t

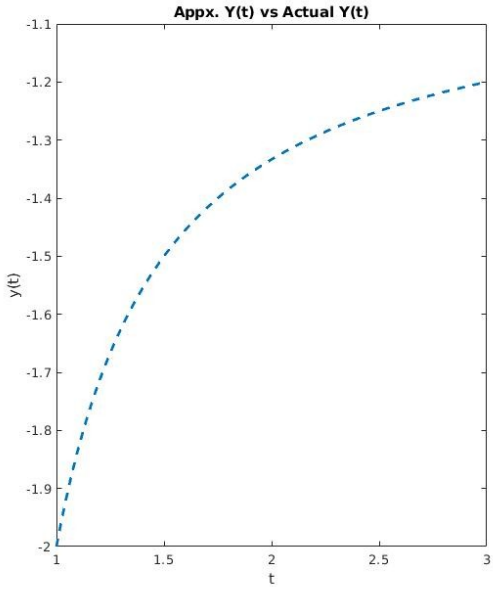

Implicit Euler
×10^-3
error(i)
t(i)


Appx. Y(t) vs Actual Y(t)
y(t)
t

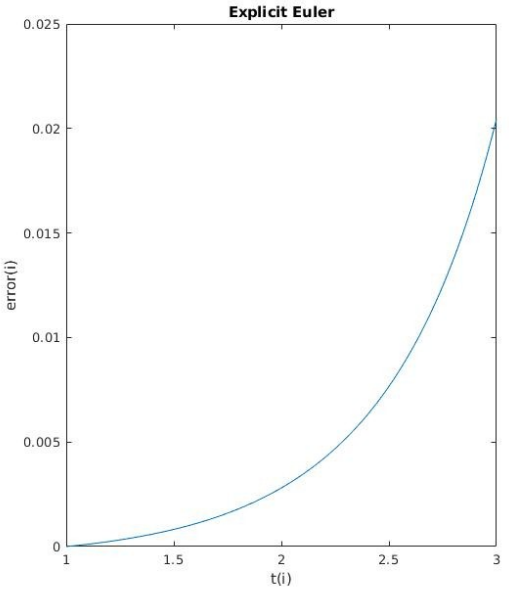

Trapezoid Method
×10^-5
error(i)
t(i)

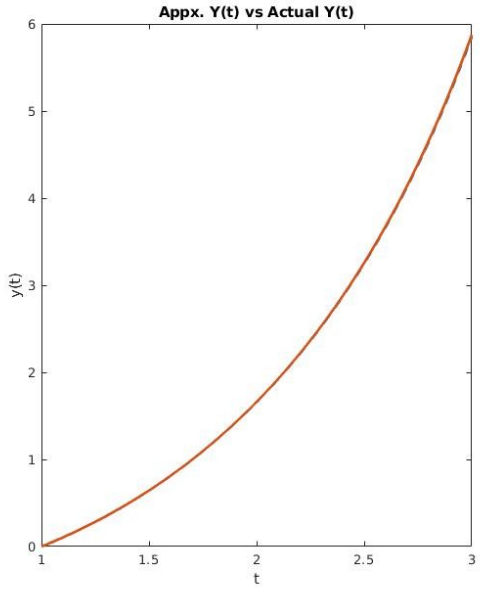

Appx. Y(t) vs Actual Y(t)
y(t)
t

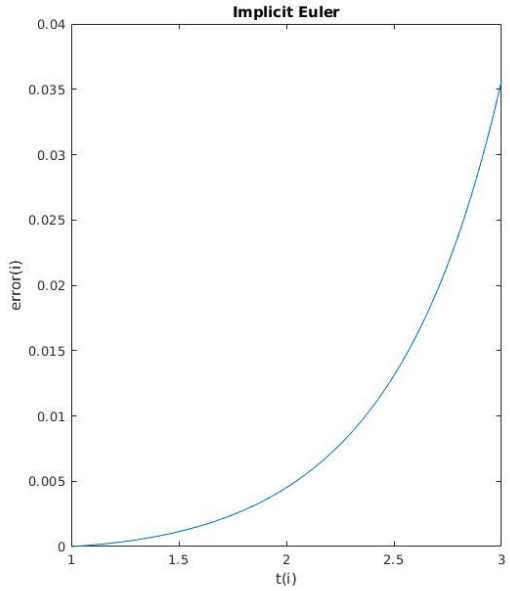

Modified Euler
×10^-4
error(i)
t(i)

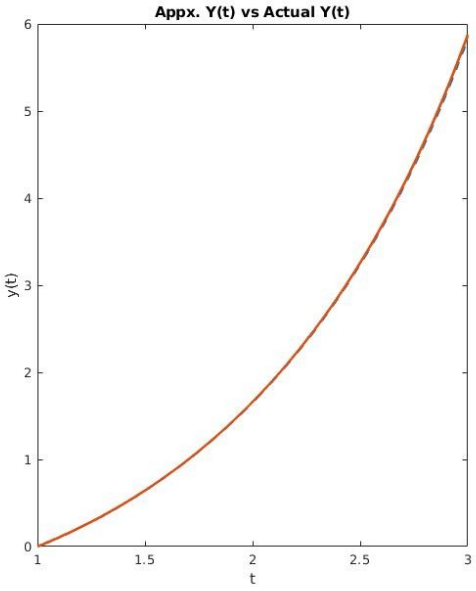

Appx. Y(t) vs Actual Y(t)
y(t)
t

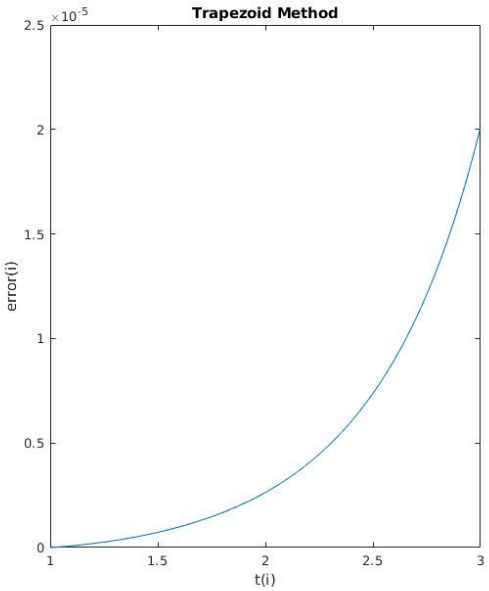
c)

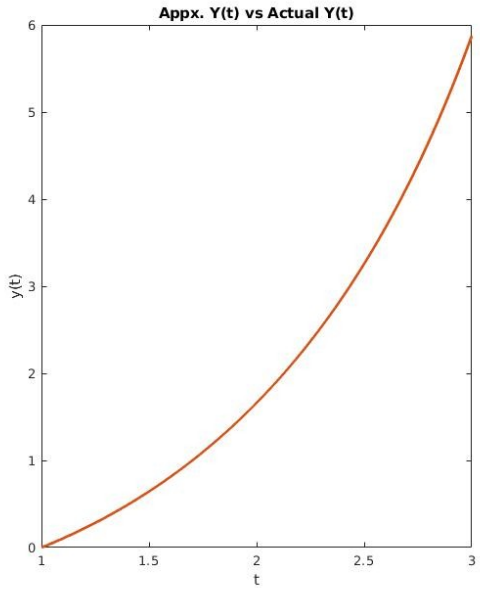

Explicit Euler
error(i)
t(i)
0.025
0.02
0.015
0.01
0.005
0
1
1.5
2
2.5
3

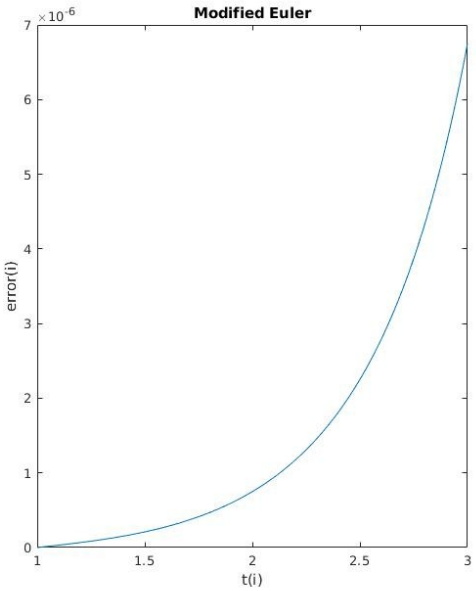

Appx. Y(t) vs Actual Y(t)
y(t)
t
6
5
4
3
2
1
0
1
1.5
2
2.5
3

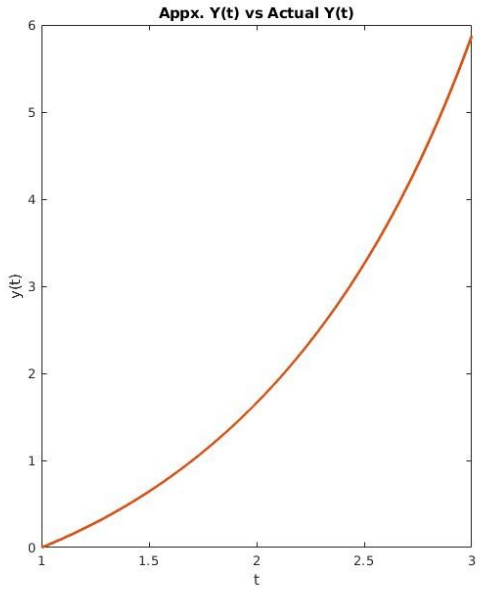

Implicit Euler
error(i)
t(i)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
1
1.5
2
2.5
3


Appx. Y(t) vs Actual Y(t)
y(t)
t
6
5
4
3
2
1
0
1
1.5
2
2.5
3

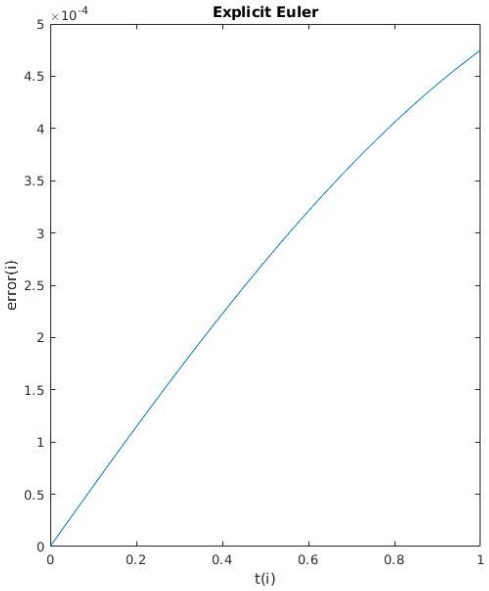

Trapezoid Method
×10^-5
error(i)
t(i)

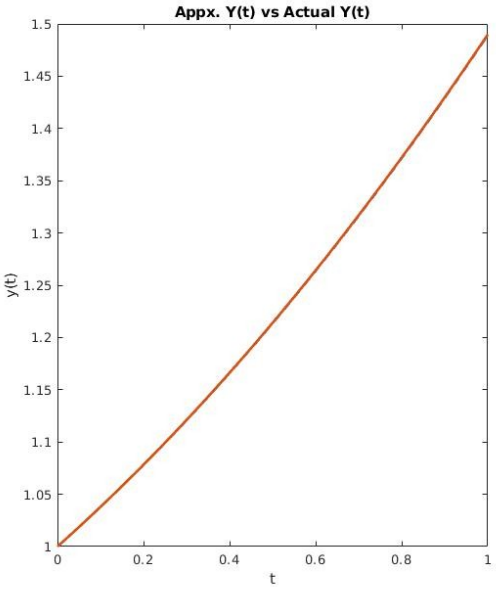

Appx. Y(t) vs Actual Y(t)
y(t)
t

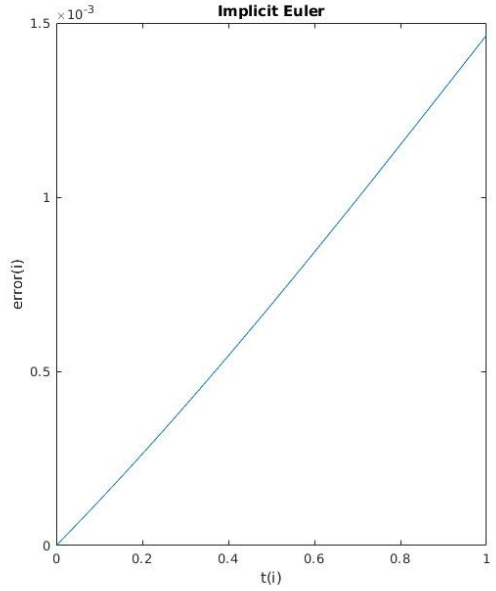

Modified Euler
×10^-6
error(i)
t(i)

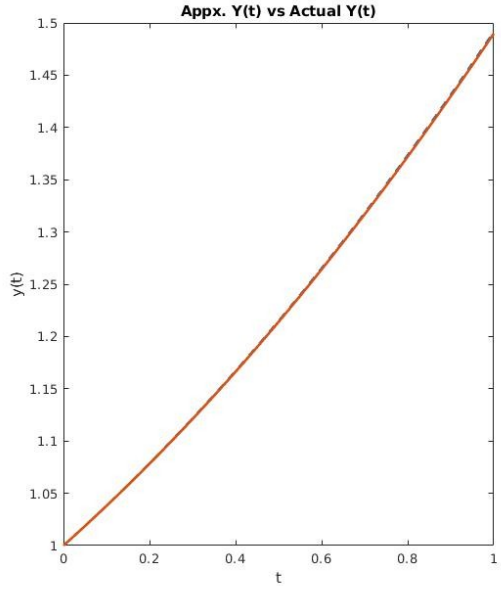

Appx. Y(t) vs Actual Y(t)
y(t)
t

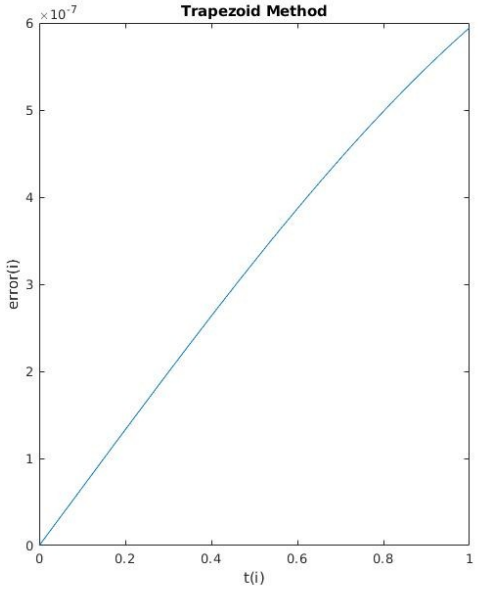
d)

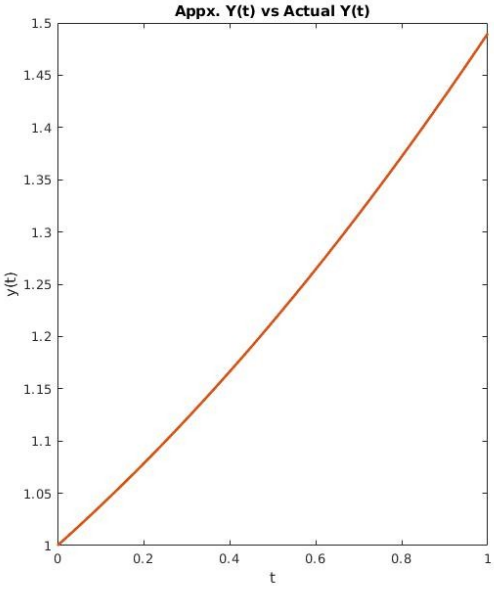

Explicit Euler
×10^-4
error(i)
t(i)

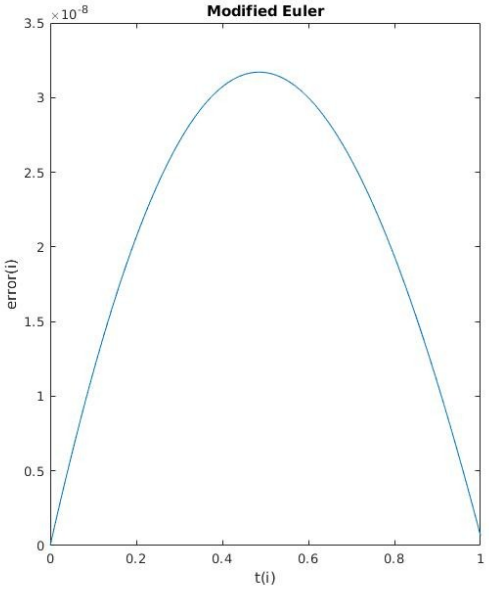

Appx. Y(t) vs Actual Y(t)
y(t)
t

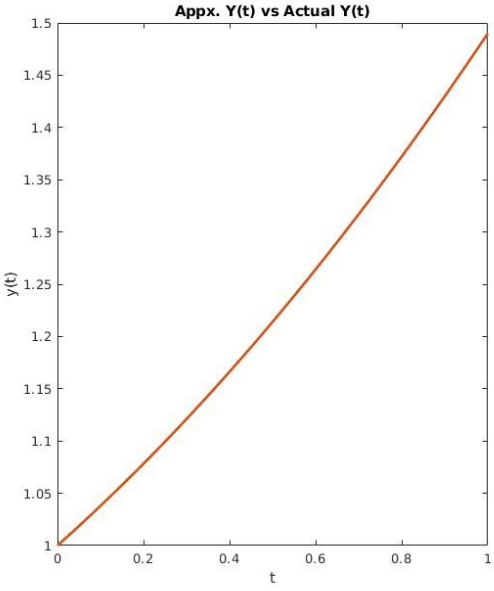

Implicit Euler
×10^-3
error(i)
t(i)


Appx. Y(t) vs Actual Y(t)
y(t)
t


Trapezoid Method
×10^-7
error(i)
t(i)


Appx. Y(t) vs Actual Y(t)
y(t)
t


Modified Euler
×10^-8
error(i)
t(i)


Appx. Y(t) vs Actual Y(t)
y(t)
t

Q5(a)
Integral with n = 2: 0.192269
Integral with n = 3: 0.192259
Integral with n = 4: 0.192259
Integral with n = 5: 0.192259

Q5(b)
Integral with n = 2: 2.591325
Integral with n = 3: 2.589258
Integral with n = 4: 2.588633
Integral with n = 5: 2.588629

Q5(c)
Integral with n = 2: -0.176819
Integral with n = 3: -0.176820
Integral with n = 4: -0.176820
Integral with n = 5: -0.176820

Q5(d)
Integral with n = 2: -0.730723
Integral with n = 3: -0.733799
Integral with n = 4: -0.733960
Integral with n = 5: -0.733969