Eso208
Programming Assignment 4

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Group: J4

1. Romberg and Gauss-Legendre

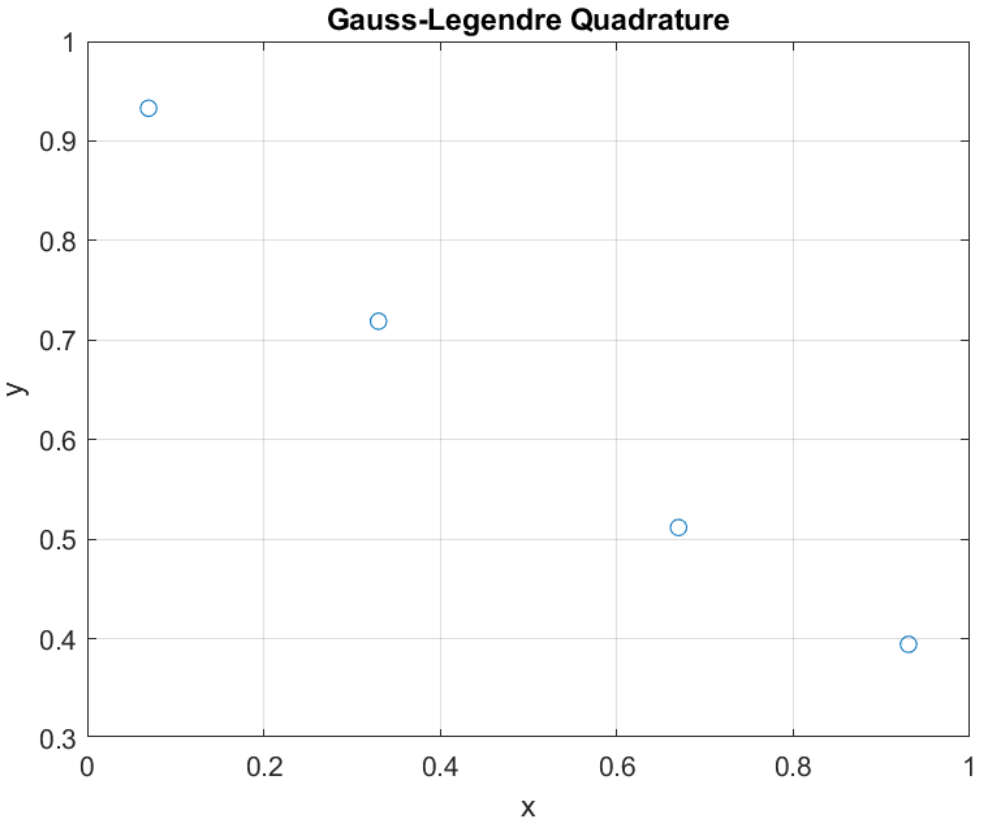
f(x)=exp(−x)! Function
0, 1 ! a, b
0.01 ! Allowable error (%)
1 ! Romberg

Give the function in x :exp(-x)
Enter lower limit of integration
0
Enter upper limit of integration
1
Enter the maximum allowable approximate relative error
0.01
Enter the method you want to use
1. Romberg Integration
2. Guass-Legendre quadrature
1

ans =

0.6321
err =
0.0031
iter =

7



For Gauss-Legendre

Give the function in x :exp(-x)
Enter lower limit of integration
0
Enter upper limit of integration
1
Enter the maximum allowable approximate relative error
0.01
Enter the method you want to use
1. Romberg Integration
2. Guass-Legendre quadrature
2
0.6321

0.6321

Ix =

0.6321

iter =

3

err =

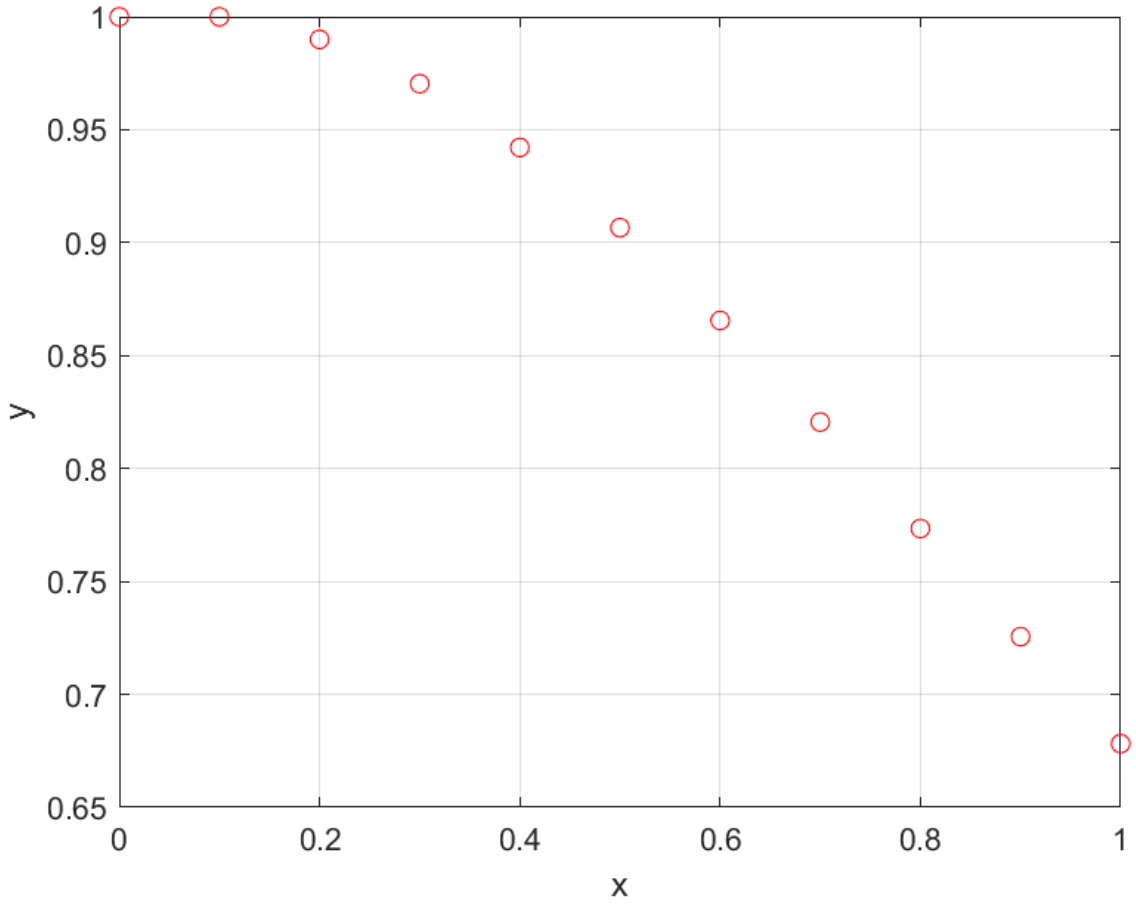
4.7906e-05

2. Initial value problem

```
Give the function in t and y :-(y^2)*t
Enter initial value of t0
0
Enter initial value of y0
1
Final value of tf
1
interval size
0.1
Enter the method you want to use
1. Forward Euler
2.2nd order RK method (Midpoint method)
3.4th order RK method
1

ans =

    -4

t0 =

     0

y0 =

 1
```

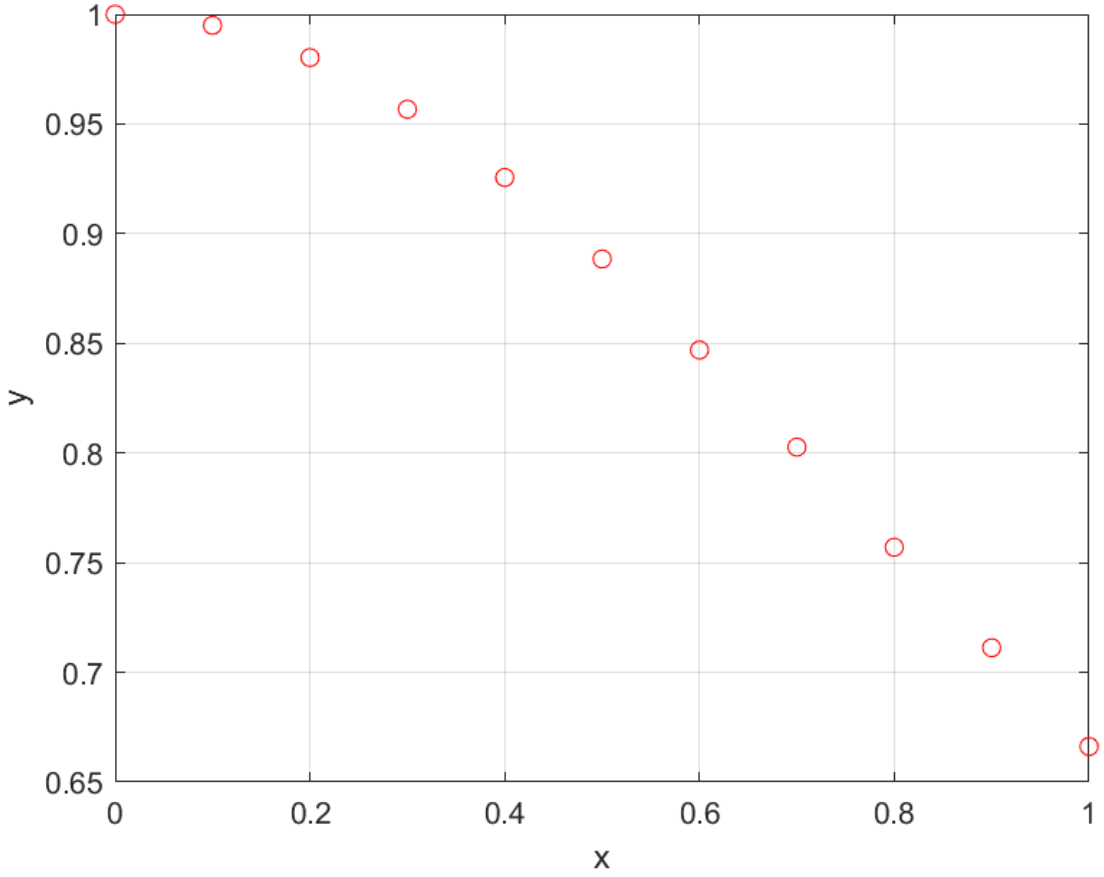
1. Forward Euler

```
t, y
0.000000 1.000000
0.100000 1.000000
0.200000 0.990000
0.300000 0.970398
0.400000 0.942148
0.500000 0.906642
0.600000 0.865542
0.700000 0.820592
0.800000 0.773456
0.900000 0.725598
1.000000 0.678213
```



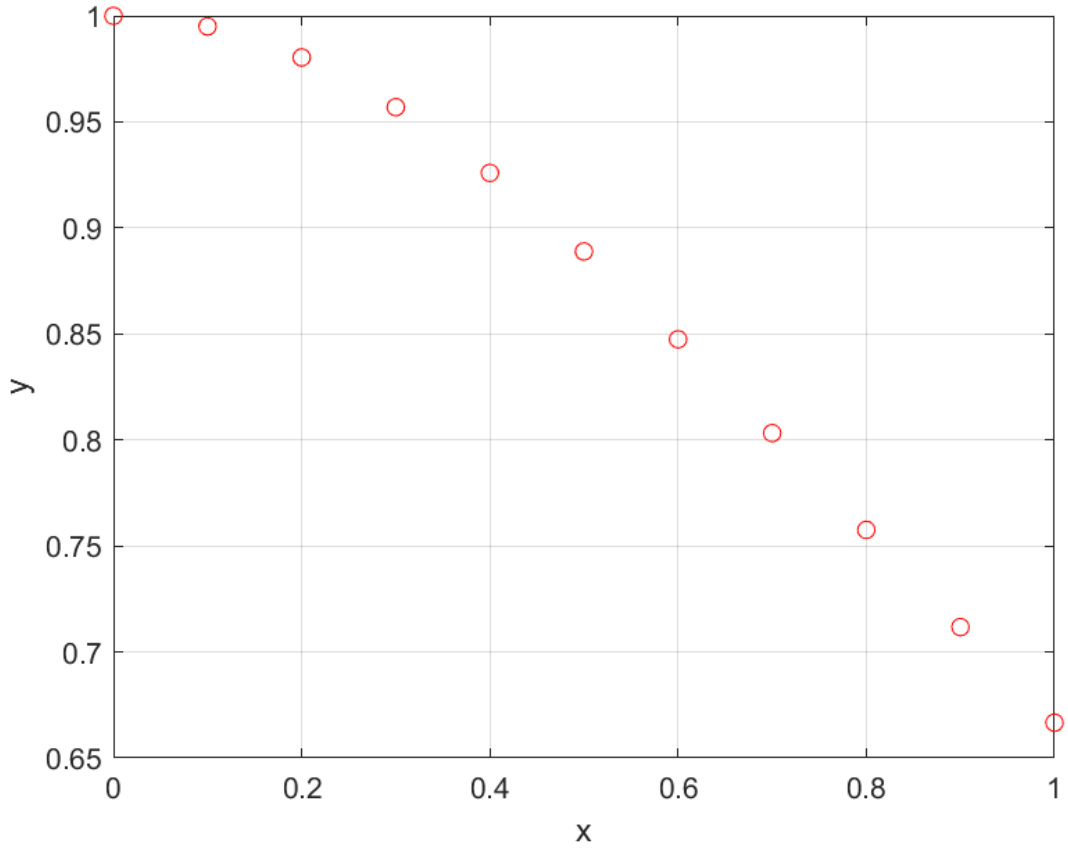
2. 2nd order RK method (Midpoint method)

```
t, y
0.000000 1.000000
0.100000 0.995000
0.200000 0.980297
0.300000 0.956741
0.400000 0.925617
0.500000 0.888477
0.600000 0.846967
0.700000 0.802679
0.800000 0.757034
0.900000 0.711226
1.000000 0.666198
```



3. 4th order RK method

```
t, y
0.000000 1.000000
0.100000 0.995025
0.200000 0.980392
0.300000 0.956938
0.400000 0.925926
0.500000 0.888889
0.600000 0.847457
0.700000 0.803213
0.800000 0.757576
0.900000 0.711744
1.000000 0.666667
```


1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
y
0
0.2
0.4
0.6
0.8
1
x