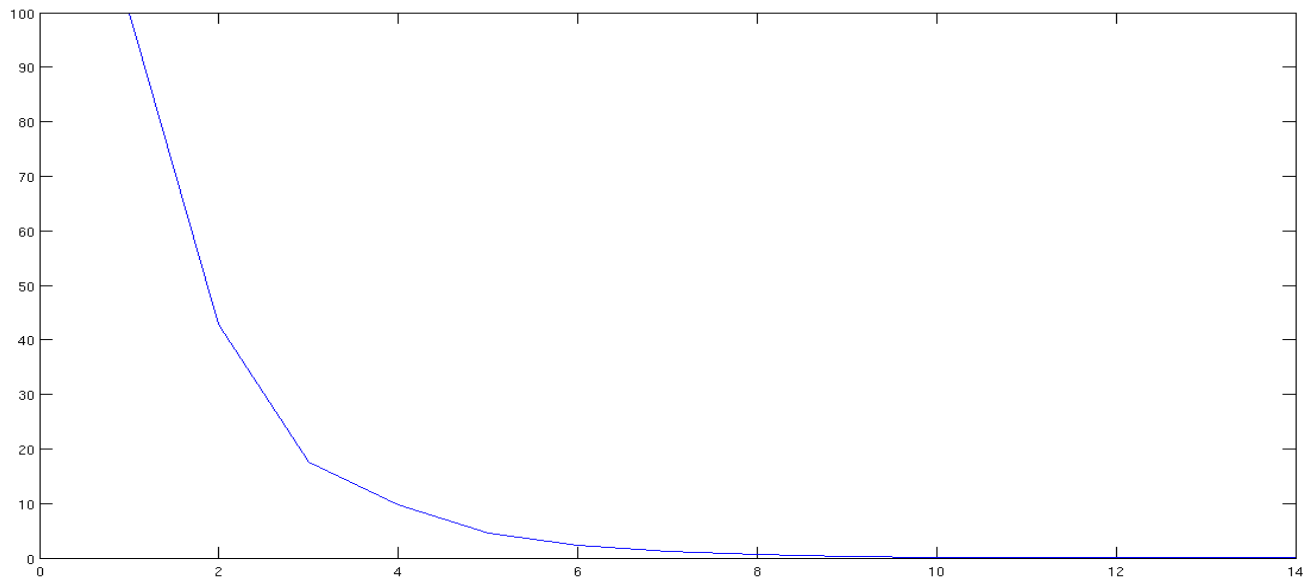# MAT 202E - NUMERICAL METHOD
CRN: 20964
INSTRUCTOR: BERK CANBERK

HOMEWORK-1
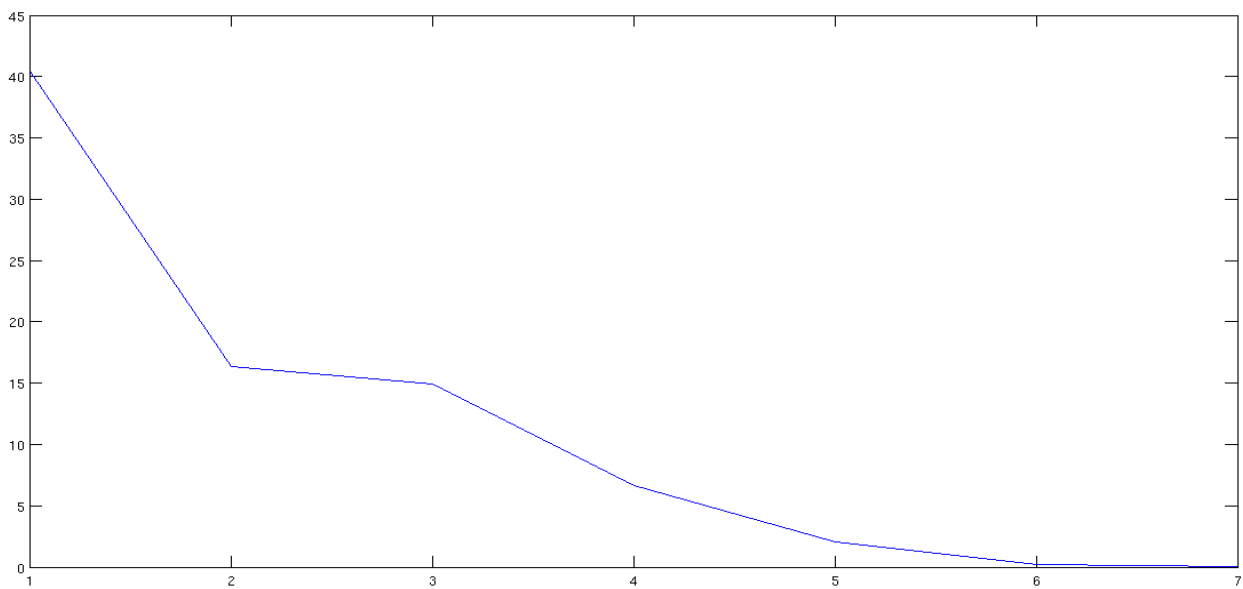## DATE: 15.04.2013

TUĞRUL YATAĞAN
040100117

1) With %0.01 relative error finishing condition, these are the plot of relative errors of each method using initial conditions:
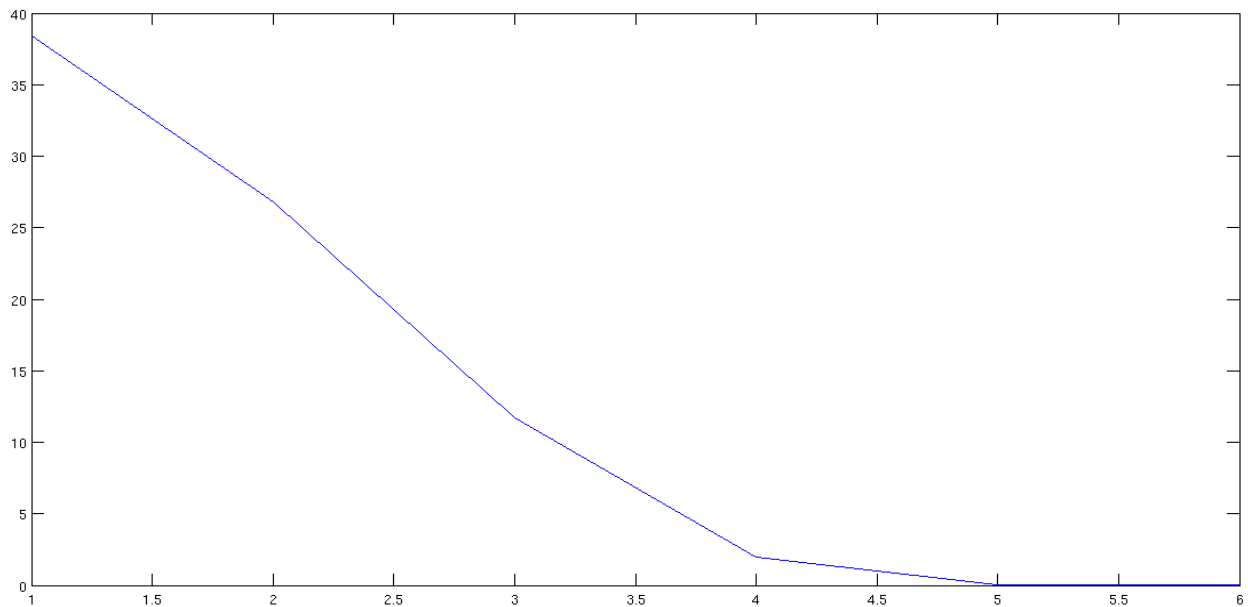
Bisection method

Iteration number for Bisection method is 14.

Secant method

Iteration number for Secant method is 7.

Newton-Raphson method

Iteration number for Newton-Raphson method is 6.

According to these plots Newton-Raphson method is the fastest algorithm for this equation.

Matlab codes for these scripts are under the Q1 folder that are bisection.m , secant.m , newtonraphson.m
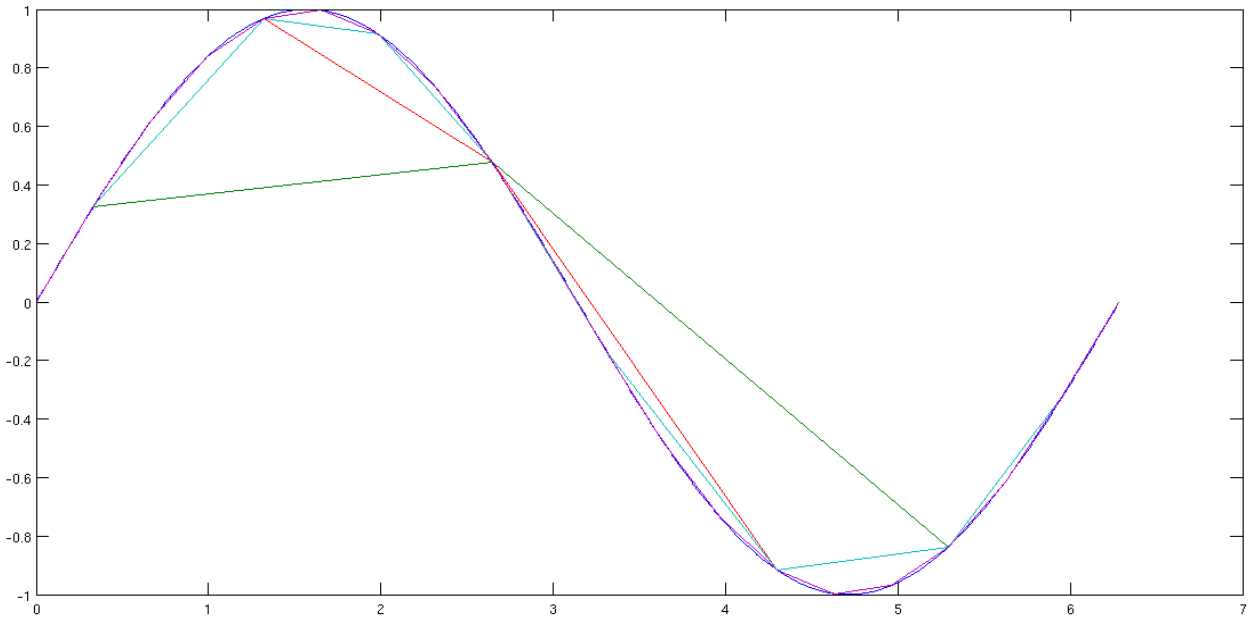
Scripts executes without input or output paramaters.
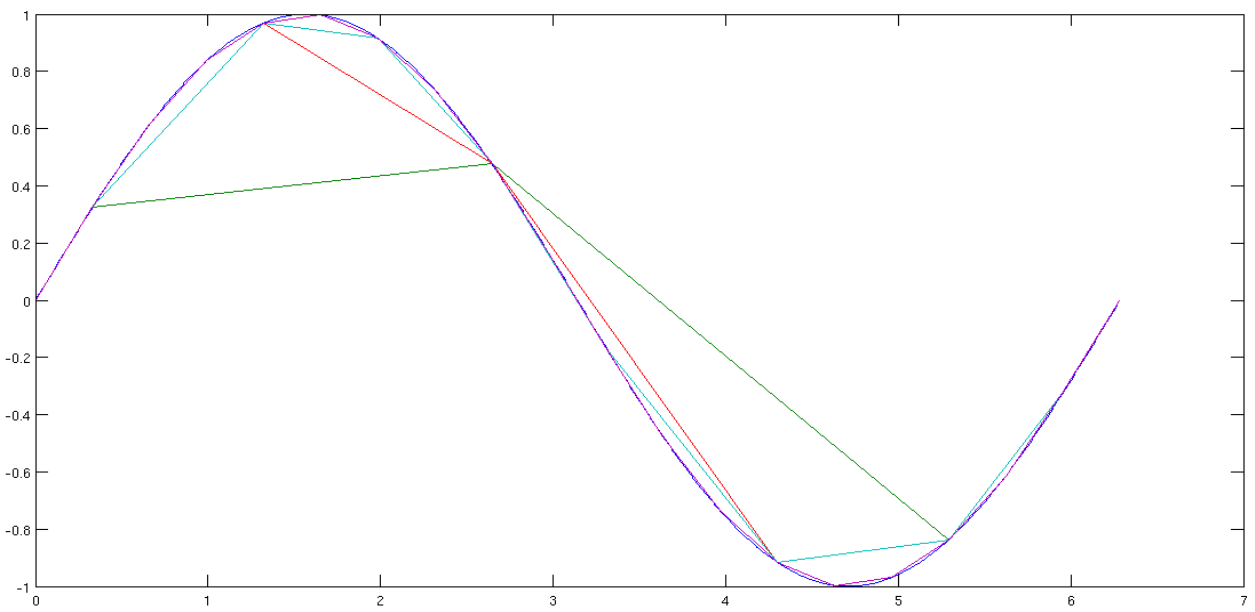
Example output:

```
>> secant
Root x for Secant Method = -2.0001 with relative error = 0.0072237
```

2) f(x) = sin(x) between [0, 2π]

Lagrange interpolation

Newton's Divided Difference interpolation

Matlab codes for these scripts are under the Q2 folder that are lagrange.m , newton.m

Example output:

```
>> newton
SamplePoints =
  Columns 1 through 6
     0   0.3307   0.6614   0.9921   1.3228   1.6535
  Columns 7 through 12
   1.9842   2.3149   2.6456   2.9762   3.3069   3.6376
  Columns 13 through 18
   3.9683   4.2990   4.6297   4.9604   5.2911   5.6218
  Columns 19 through 20
   5.9525   6.2832
Enter X coordinate for interpolation: 0.3307
p(x) points are = 0.3247    0.32471    0.32471    0.32471
```

Program waits for user input for interpolation point. If we choose common point the results will be the same. [2,9,17] members of array (which keeps our sample points) are common in this example.

3)

Number Of Sample And Mean Distance
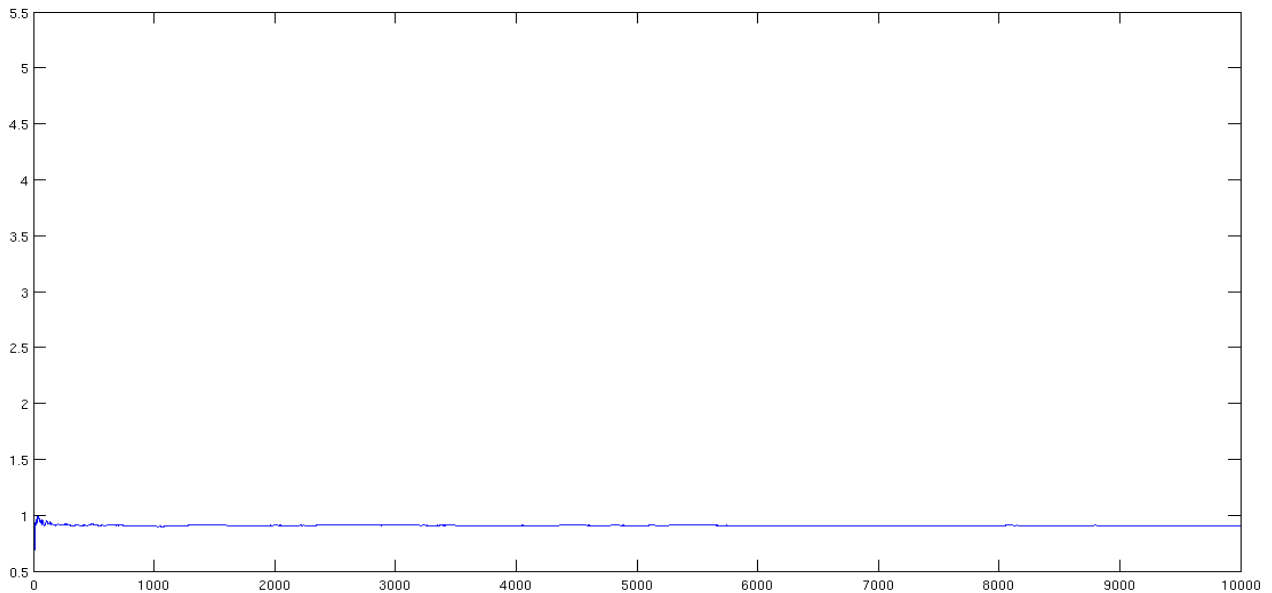
Matlab codes for this script and function are under the Q3 folder that are meandistance.m , randdistance.m
Main script for this script is meandistance.m, randdistance.m is assitant funciton. randdistance.m generates random two points and returns their distance between them to the main script.

Example output:

```
>> meandistance
Enter n iteration number(ex:1000): 1000
```

meandistance.m waits for user input for iteration number.

Approximate mean value of distance coverges to 0.9 when large amount of sample calculation.