RULES

1. The answers of the exercises will be posted on our website at 17:00 PM on 11.12.2012: www2.ce.metu.edu.tr/~ce305 .
2. This is the **version 5.0**. In case there are any corrections for this exercise, we will post an updated version on our website. You can follow the changes in the exercises by the **Version History** section below.

Version History

V5.0 Exercise is released.

1. The following data were generated from the normal distribution:

x	-1.5	-1.0	-0.5	0	0.5
$f(x)$	0.129518	0.241971	0.352065	0.398942	0.352065

a) Plot the given data.

b) Integrate this data from x=-1.5 to x=0.5 using

i. Trapezoidal rule,

ii. Simpson's 1/3 rule,

iii. Composite Trapezoidal Rule

iv. Composite Simpson's 1/3 rule.

In both of the composite rules, use 4 intervals (segments). (n=4)

c) Compare your results obtained with different integration formulas and briefly explain why any particular method works better than others for the given data set. (Note that the true value of the integral is 0.624655.)

2. The formula for the arc length of any curve y=g(x) over the interval [a,b] is:

$$\text{arc length} = \int_a^b \sqrt{(1+(\frac{dy}{dx})^2}\, dx$$

Given $y=g(x)=x^3$, approximate the arc length for the interval [0,1] using:

a) Simple Trapezoidal rule

b) Composite Trapezoidal rule with N=4 intervals.

c) Composite Simpson's rule with N=4 intervals.

d) Write a MATLAB Code that finds the arc length by Composite Trapezoidal Rule and Composite Simpson's Rule. Find arc lengths using N=4, 6 and 8. Compare the accuracy of the results.