Quiz (III)

Finished by 18:30 on 5/17

Create a matlab script F7xxxxxxx_quiz3.m and link all the programs to this script. Make sure once type the filename' F7xxxxxxx_quiz3', the results of the following problems will pop-up automatically in order. Remember not to type any 'clear all ' or 'close all' command in any of the codes.

1. [F7xxxxxxx_quiz4_prob1.m & Figure 1]
   Given the definite integral

   $\int_{1/4}^{1/2} \pi \cos \pi x \ dx$

   Use box counting and Trapezoid method to analyze the error with different h values, say for example from h = 10^{-100} to 10^{-1}.
   (1) Plot the ABSOLUTE ERROR versus h in Log-Log scale with appropriate figure legends to indicate correspondence between the error curve and the method.
   (2) Print the integration with 8 significant digits. Which h is an optimal choice if 8 significant digits are required for the method selected?

2. [F7xxxxxxx_quiz4_prob2.m & Figure 2 (if you use pictorial method to find the optimal h)]
   Given the definite integral

   $\int_0^2 e^{-x^2} \ dx$

   (1) Find the answer with 8 digit precision using Simpson's Method.
   (2) Which h is optimal for the Simpson's Method? Explain how you find the optimal h.

3. Use Monte Carlo Method to estimate the area of the ellipse enclosed by $\frac{x^2}{100} + \frac{y^2}{64} = 1$.

   How many points does it require for the result to achieve 2-digit precision?