Quiz (IV)

Finished by 18:30 on 5/28

Paste the figures on a word, or PDF document and upload it with the m files.

Create a matlab script and change the filename to F7xxxxxxx_quiz4.m. Link all the programs to solve following problems to this script. Make sure once type the filename' F7xxxxxxx_quiz4', the results of the following problems will pop-up automatically in order. Remember not to type any 'clear all ', '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 (Riemman Sum) and Trapezoid method to analyze the result and its error with different h values, say for example from h = 10^{-100} to 10^{-1}.
   (1) Plot the absolute error versus the step size h in Log-Log scale with appropriate figure legends to indicate correspondence between the error curve and the method.
   (2) Which h is an optimal choice if 8 significant digits are required for each method?

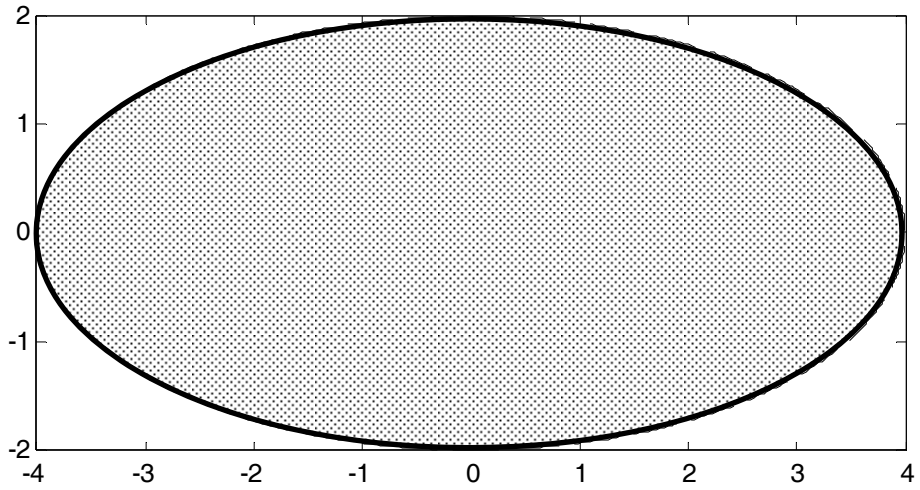
2. [F7xxxxxxx_quiz4_prob2.m & Figure 2 (if you use pictorial method to find the optimal h)]
   Given the definite integral

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

   Find the answer with 8 digit precision.
   (1) Which h is the optimal choice for the Trapezoid Method?
   (2) Which h is the optimal choice for the Simpson's Method?
   Note: remember to explain how you justify the precision.

3. Use Monte Carlo Method to estimate the area of the ellipse enclosed by $\frac{x^2}{16} + \frac{y^2}{4} = 1$ or the definite integral of $\int_{-4}^{4} \sqrt{16 - x^2}\, dx$

   How many points does it require for the result to achieve 4-digit precision?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