

Name:

Lab# 08
Numerical integration

Your ID #:

Please answer the below questions:

Q1 (5pts): Evaluate the integral $\int_1^2 \frac{1}{1+x} dx$

Using one interval and Multiple Application. Compare the error of each method for one interval and how many integral is required to reduce the relative error to 0.01%

- a) Exact solution
- b) Trapezoid method
- c) Simpson's 1/3-Rule
- d) Simpson's 3/8-Rule
- e) Monte Carlo

Q2 (5pts): Compare the accuracy of the Trapezoid, Simpson's 1/3 Rule, and Simpson's 3/8 Rule methods for the function $f(x) = x^2$ from $x=0$ to $x=1$, using 4 intervals. Write the answer in the following format (same digit numbers):

Trapezoid method: xxxxxx

Simpson's 1/3 Rule: xxxxxxxxxxxxxx

Simpson's 3/8 Rule: xxxxxxxxxxxxxx

Exact solution: 0.3333333333333333

Q3 (5pts): Estimate the value of the integral of the function $f(x) = \sin(x)$ from $x=0$ to $x=\pi/2$ using the Monte Carlo method with 10000 samples.