Introduction to Scientific Computing, PSCB57, Fall 2018
Assignment 4
Integrals

Instructions

- You must submit the assignment electronically via Quercus. The deadline for this assignment is Monday, November 5th, 9am. Late assignments will not be accepted unless accompanied by supportive documentation.
- This assignment comes in multiple parts. Submit all your answers in one Jupyter Notebook file with the file type `ipynb`.
- Use mark-down cells to add your name, student number. Also use mark-down cells and python comments to describe your code! Well documented code might help you with the quiz.
- Do not use any packages or libraries other than numpy and matplotlib in this assignment.
- You must be present at the tutorial on Tuesday where you will be quizzed about your assignment. If you do not show up or fail to pass the quiz, your assignment might be marked as 0% even if it was correct.
- Plagiarism is taken very seriously. However, you are not expected to work in solitude and are encouraged to talk to your classmates. But keep in mind that if you submit an assignment, you have to fully understand it in order to pass the quiz.

Part 1

Numpy provides a function `trapz` which can be used to integrate a function with the trapezoidal rule. Look up the documentation and familiarize yourself with the syntax. Then use it to approximaste the following integral:

$$\int_0^1 \sin(x)dx.$$

Divide $[0, 1]$ into 10 sub-intervals for this test case. Note that the number of intervals might not be necessarily equal to the number of points you need to pass to the numpy function.

Part 2

Write a new function `simpson` which implements Simpson's Rule. It should be a drop-in replacement for the numpy function `trapz`. In other words, you should be able to call your function with the exact same arguments as you called `trapz` in Part 1.

Which of the two algorithms gives you a more accurate result?