MTH 264 – Computer Project 2
Use numerical integration to approximation of the definite integral using the listed below:

1. Methods:
   (a) Simpson's Rule (computer project 1)
   (b) Composite Midpoint Rule
   $$\int_a^b f(x)dx = \frac{(b-a)h^2}{24} f''(\frac{a+b}{2}) + h\sum_{i=1}^{N} f(\frac{x_{i+1}+x_i}{2})$$
   where $h = (b-a)/N$.

2. Alternative Extended Simpson's Rule
   $$\int_a^b f(x)dx = \frac{h}{48}\{17f(x_1) + 59f(x_2) + 43f(x_3) + 49f(x_4) + 48\left[\sum_{i=5}^{N-3} f(x_i)\right] + 49f(x_{N-2}) + 43f(x_{N-1}) + 59f(x_N) + 17f(x_{N+1})$$
   where $h = (b-a)/N$.

3. Use Simpson's Rule, Composite Midpoint Method and Alternative Extended Simpson's Rule to approximate the following integral. Find the minimum N to yield a correct 4 decimal places correctly? Note only use N as an even counting number and START with $N = 8$ and $a = 0.0000000001$
   (a) $\int_a^{\pi/2} \frac{x}{\sin(x)} dx$
   (b) $\int_a^{\pi/2} \frac{e^x - 1}{\sin(x)} dx$
   (c) $\int_a^{1} \frac{\arcsin(x)}{x} dx$

4. Use the three-methods above, write codes to compute the arc length of $f(x)$ on $[a, b]$ and volume of $f(x)$ on interval $[a, b]$ revolve along x-axis. What is the minimum N to yield a correct 4 decimal places correctly?
   (a) $f(x) = \frac{x}{\sin(x)}$ from $[a, \pi/2]$
   (b) $f(x) = \frac{e^x - 1}{\sin(x)}$ from $[a, \pi/2]$
   (c) $f(x) = \frac{\arcsin(x)}{x}$ from $[a, 1]$

RUBRIC:
+ Hard copy of the report is due on OCTOBER 31, 2018 AT 8PM NO LATE WORK ACCEPTED.
+ Answers all questions and label it.
+ Must type and print all work follow by all code attached at the back of the report.
+ You may work with one partner
+ You turn in as many draft as possible to receive 100% no later than OCTOBER 24, 2018