You are encouraged to work with other students on this assignment but you are expected to write and work on your own answers. You don't need to provide the name of students you worked with.

You are expected to submit

(a) a zipped file containing all your work online on Sakai so the grader can reproduce your results using only your online submission. Due on Sakai, Wednesday, Nov. 20.

(b) a print-out copy of your obtained results (don't print out the *.dat files) for each problem. Due in class, Wednesday, Nov. 20.

Problem 1 : Composite Simpson's rule

Write a program (function .m file) that implements the **Composite Simpson's rule** to approximate the integral $\int_a^b f(x)dx$ by repeatedly bisecting the integration interval and using **Simpson's rule** on each subinterval (start with one interval). As the stopping criterion, require that successive approximations differ by no more than a given tolerance. The program should also count the total number of function evalutions done.
Hint: the first (header) line of your function compSimpson.m file shall be

```
function [numI, N] = compSimpson(f, a, b,TOL)
```

where the output `numI` is your numerical integral value, and `N` is the total number of function calls used to obtain `numI`.

(i) Use your code to compute $\int_0^{48} \sqrt{1+\cos^2 x}\,dx$ with a tolerance of 10^{-5}. Print out (on screen) the computed value of the integral and the number of function evaluations.

(ii) Use your code to compute $\int_{10}^{19} \sin(t^2)\,dt$ with a tolerance of 10^{-5}. Print out (on screen) the computed value of the integral and the number of function evaluations.

(iii) Use your code to compute the cumulative integral $\int_0^x e^{-t^2}\,dt$ for $x = 0, 0.02, 0.04, ..., 1$ (in MATLAB, $x = [0 : 0.02 : 1]$;) with a tolerance of 10^{-5}. Plot your computed cumulative values against the vector of x-values (i.e. the x-values are `x=[0:0.02:1]`, and the y-values are your computed cumulative integral $y_k \approx \int_0^{x_k} e^{-t^2}\,dt$). Save the values of the cumulative integral as a column vector in `A1.dat`.

For this problem, please (1) include all your code and generated `.dat` file A1.dat in the online submission, and (2) report the answers to (i) and (ii), and the plot in (iii) in your print-out submission. [use publish command to generate a print-out pdf file for the print-out submission]

Problem 2 : Composite Gaussian quadrature rule

Repeat Problem 1 for the **composite 3-node Gauss quadrature rule**. Save your part (i) result in `A21.dat`, your part (ii) result in `A22.dat`, and your part (iii) result in `A23.dat`.
For this problem, please (1) include all your code and generated `.dat` files in the online submission, and (2) report the answers to (i) and (ii), and the plot in (iii) in your print-out submission.