Numerical method
Midterm Exam (2020/06/01 11:00~12:00)

學號：_____　　姓名：_____

程式題(Use MATLAB)

完成試題請將資料夾壓縮，繳交至 Moodle。並將壓縮檔檔名改為自己的學號。

7. (14%) Compute $\int_{0.5}^{1.5} e^x \cos x \, dx$ using a Gauss-quadrature with 7 points and calculate the relative error.

Number of points, n	Points, x_i	Weights, w_i
7	$x_1 = -0.9491$	$w_1 = 0.1294$
	$x_2 = -0.7415$	$w_2 = 0.2797$
	$x_3 = -0.4058$	$w_3 = 0.3818$
	$x_4 = 0$	$w_4 = 0.4179$
	$x_5 = \ \ 0.4058$	$w_5 = 0.3818$
	$x_6 = \ \ 0.7415$	$w_6 = 0.2797$
	$x_7 = \ \ 0.9491$	$w_7 = 0.1294$

8. Develop a MATLAB code which constructs a cubic spline interpolant with the **TDMA**.

$$f(x) = \frac{1}{1 + 25x^2}$$

Interpolate the given function at

(a) (8%) 5 equally spaced points between -1 and 1,

(b) (8%) 21 equally spaced points between -1 and 1.

Plot your solution (uniform discretization with at least 100 points over that range) for each case and compare your answer to the exact solution (need to show on a plot). Plot the relative error distributions (versus the variable x), calculate and **"comment"** on the average relative error of each case.

Note: (1) We provide **'TDMAsolver'** and **'funS'** code on moodle**.** If you use **spline, genspline, interp1, interp2** and **other similar syntax** to solve directly, instead of using **TDMA**, no points will be given.

(2) Use the command **"disp('your comment')"** in your program 8(b).