ME2-HCPT Final Test Tuesday

Name:	CID number:

This is an open book exercise. You can **reuse/adapt/amend** any of your previous scripts, as long as you submit them.

Duration: 1h 20min

In your H drive create a folder *H:\ME2CPT\Final*.

Comment, sensibly, all your scripts **[5]**

Write at least a main script for each task, and name the files taskA.m, taskB.m, taskC.m. If you need or wish, you can then subdivide the tasks and write any associated functions, at your convenience.

Task A [17]

The files *Zener.txt* and V*Source.txt* contains two sets, (x_Z, y_Z) and (x_S, y_S) respectively, of data points.

1. Read in the files and plot the two sets of data, *y* vs *x*, on the same graph.

2. Fit the two sets of points with polynomials: the first, (x_Z, y_Z), with a polynomial of order 6, and the second, (x_S, y_S), with a polynomial of order 2.

3. Evaluate the two fitting polynomials in the interval [-8 : 0.01 : 4].

4. The two fitted polynomials intersect each other at the intersecting point (x_0, y_0). Find the value of x_0 by using the bisection method, with a tolerance of 0.01.

Task B [18]

1. Solve numerically the ordinary differential equation:

$$\frac{d}{dt}\left(e^t \frac{dy}{dt}\right) = 3y^2 cos(t^2)$$

with the initial conditions y(0) = 2 and $\left.\frac{dy}{dt}\right|_{t=0} = \frac{\pi}{4}$.

Compute and plot *y(t)* vs *t* in the range *t* = [0 : 0.01 : 2].

2. Save the values of *t* and *x* in the file *mysol.txt*, in two columns format.

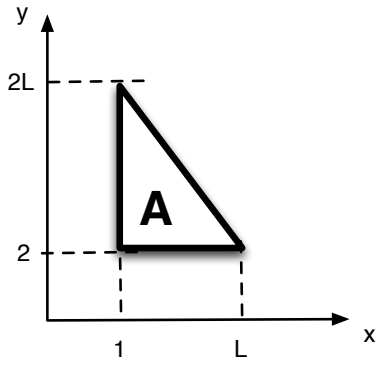
Use this blank space to write anything you wish to submit

Task C [20]

1. Solve numerically, by using the trapezoidal scheme (with $dx = dy = 0.1$), the integral:

$$S = \iint_A (x + y^2) dA$$

over the domain A described in the figure:



2. Repeat the calculation for values of L = [4 : 1 : 50] and plot the values of the integral *S* vs L.

Upload ALL your scripts and results on Blackboard.

Useful Matlab functions for this test:	
dlmread	- reads multiple lines of numbers from a file
dlmwrite	- writes numerical data to a file
polyfit	- finds coefficients of polynomial to required degree
polyval	- evaluates a polynomial at specified points

Use this blank space to write anything you wish to submit