ME2-HCPT End of Term Test

CID number:	0								
	1st	2nd	3rd	4th	5th	6th	7th	8th	

Comment appropriately all your scripts. Comments are marked too! [3]

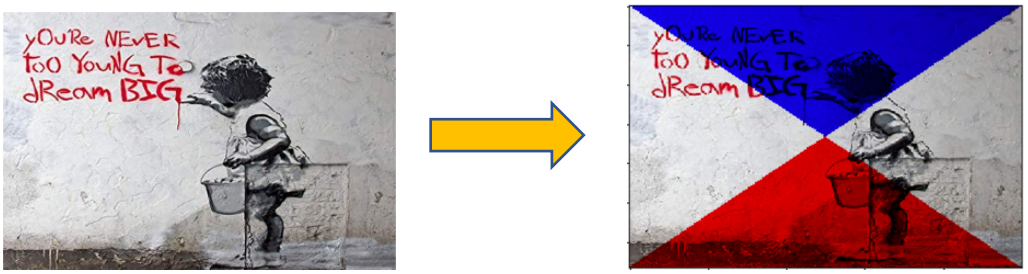
STATE YOUR CID into a comment at the beginning of every file

Task A [11]

The file *Banksy.jpg* contains an image. Write a script (name it *ExA*) to:

1. Read in the file and plot the image.

2. Render the two triangular parts with blue and red components only, as in the example.



3. Save the final image in the file *Tactics.jpg.*

Save your files frequently

Task B [14]

Consider the set of points: x_n = *[1,2,3,4,5,6,7,8]* and y_n = *[1st,2nd,3rd,4th,5th,6th,7th,8th]* digits of your CID.

1. Write a script (name it *ExB*) to interpolate these points in the range *x = [1 : 8]* with interval dx = *0.1*, by using Lagrangian polynomials. (Write all the computation into one single code, with no functions).

2. Plot the interpolating points and the interpolated curve on the same graph.

Save your files frequently

Task C [15]

1. Solve numerically the ordinary differential equation:

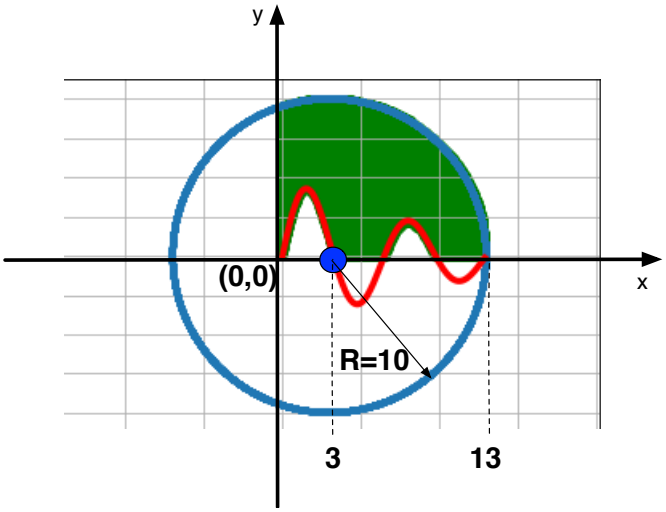
$$2x\frac{d^2y}{dx^2} + 10x^2\frac{dy}{dx} + (2x^2 + 14x)\sin(x) = 0$$

with the initial conditions y(0) = 3rd and $\left.\frac{dy}{dx}\right|_{x=0} = 5^{th}$ (where 3rd and 5th are the digits of your CID).
Write a script (name it *ExC*) to compute and plot the numerical solution y(x) in the range x = [0 : 15] with step dx = 0.02. Use the explicit Forward Euler method.

Save your files frequently

Task D **[**17]

1. Write a script (name it *ExD*) to calculate numerically the area of the green shadowed shape in the figure, in the range *x = [0 : 13]* with interval *dx = 0.01*.



The red function inside the circle is:

$$y = 5sin\left(\frac{2\pi}{13}nx\right)e^{-x/10}$$

Determine the area for all the values of *n* in the range *n = [1st,2nd,3rd,….8th]* digits of you CID.
Deploy the trapezoidal method.

2. Plot in a graph the values of the computed areas for each value of n.

Submit on BB: files ExA, ExB, ExC, ExD