AER 336S: Problem 1

Please comment all functions and scripts and hand in with your assignment. All figures should have your name in the title and should have proper legends and labels.

(a) Write a function to interpolate the coordinates of an airfoil using the MATLAB `spline` function. Apply it to the Joukowsky airfoil coordinates from my web page and plot the results obtained by interpolating on `x_int=0:.01:1;`. You will probably wish to spline each surface individually.

(b) Next write a function which again uses the `spline` function, but first maps the given coordinates to an equally spaced domain. This works as follows. Use the `spline` function with the y values for the surface in question, but, instead of the x values, simply use $1, 2, 3, \ldots$. The spline is thus fit in a space where the original points are located at integer values. When the spline is interrogated at specific values of x, these must be transformed appropriately. You must first determine in which interval a given x_{int} falls. Its location in the transformed domain is then obtained by calculating where in that interval it lies by a linear interpolation. For example, a value of x_{int} which lies between x_3 and x_4 such that $x_{int} = x_3 + c * (x_4 - x_3)$ is assigned the value $3 + c$ where c lies between 0 and 1. So if $x_3 = 0.2$ and $x_4 = 0.3$ (these are the points where the original coordinates are given), then a value of x_{int} of say 0.27 is assigned a value of 3.7. Again apply your function to the Joukowsky airfoil coordinates and plot the results. When plotting, the correct x values must be used, not the integer values.