80 POINTS **HOMEWORK 7** **DUE: 3/3/16**

Please save your submission as HW07_[your last name].ipynb (for example, HW07_Smith.ipynb) and email it to the instructor or send a link to it on GitHub.

Use the Joukowski transformation to produce several airfoils with various thickness and camber ratios, from small to large ratios, by varying the center position of the circles you map into airfoils. Specifically, produce the following airfoils:

a. $T = 0.05$ and $H = 0.00$

b. $T = 0.10$ and $H = 0.00$

c. $T = 0.30$ and $H = 0.00$

d. $T = 0.10$ and $H = 0.02$

e. $T = 0.10$ and $H = 0.05$

f. $T = 0.10$ and $H = 0.10$

1. (20 points) Numerically determine the camber and thickness ratio of the airfoils you have plotted. How do these calculated values compare to the values of T and H given in the formulas in Panton §18.11 for the center location of the transformed circles? Comment on the accuracy of these formulas as T and H increase.

2. (40 points) Plot the streamlines for airfoils (d) and (e) at $\alpha = 0°, 10°$.

3. (20 points) Plot the pressure coefficient over airfoils (d) and (e) at $\alpha = 0°, 10°$ as a function of x (in the z-plane). These plots are usually plotted upside down (see Figure 1) and normalized by chord length.

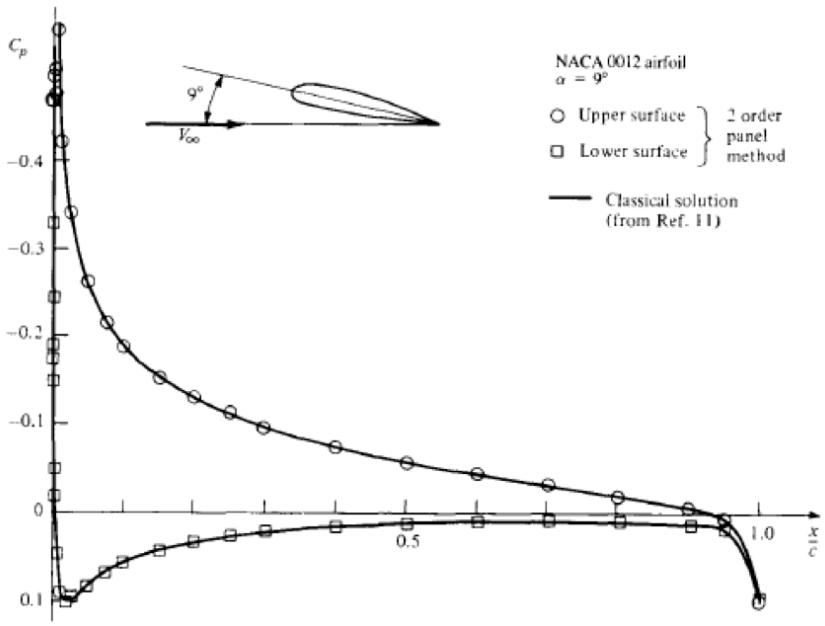

Figure 1