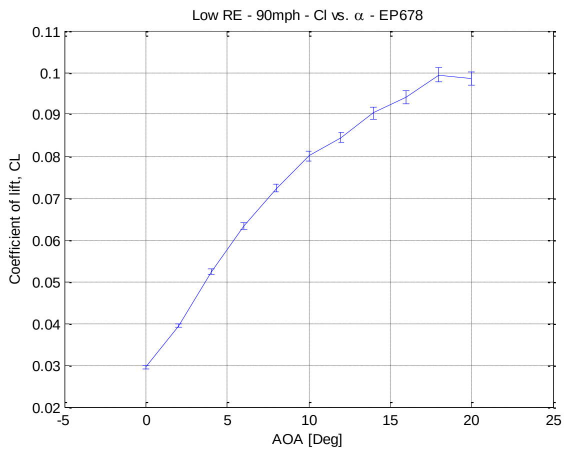
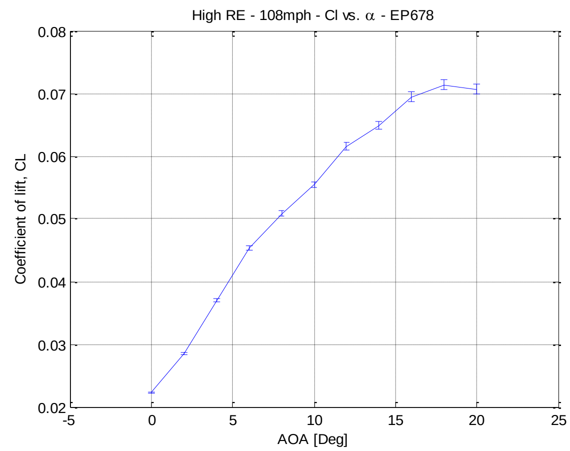
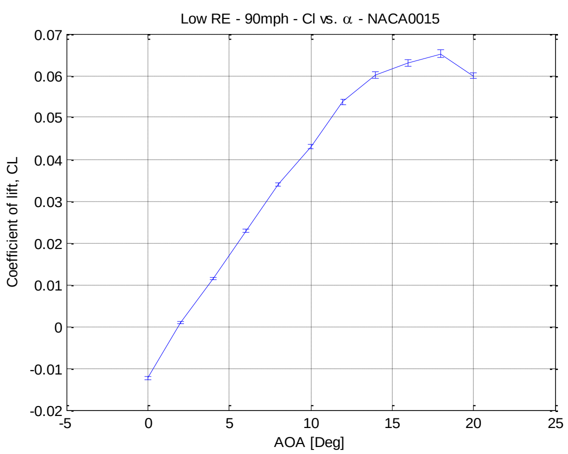
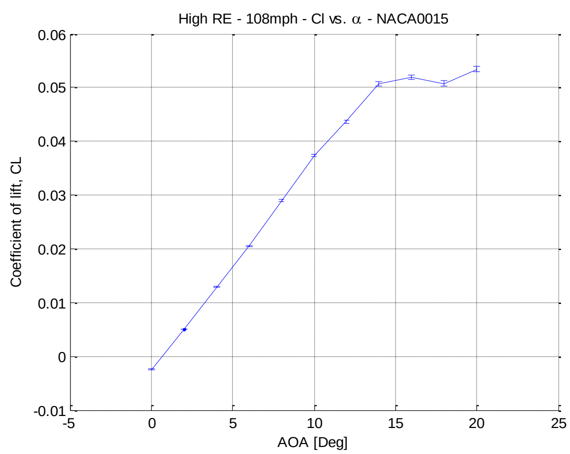
Task 2:

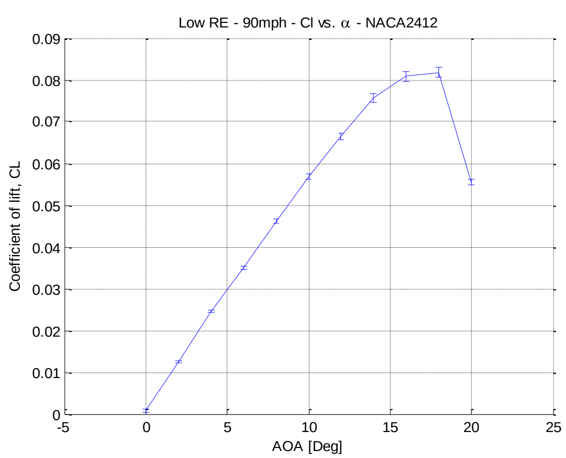
From the lift and drag data obtained in the experiment, several characteristics can be determined about the aircraft. Firstly, the lift curve and its slope. For each airfoil and for both low and high Reynold's number cases, a plot is generated of Cl versus angle of attack. The stall angle, and CL_α can be determined from these plots.

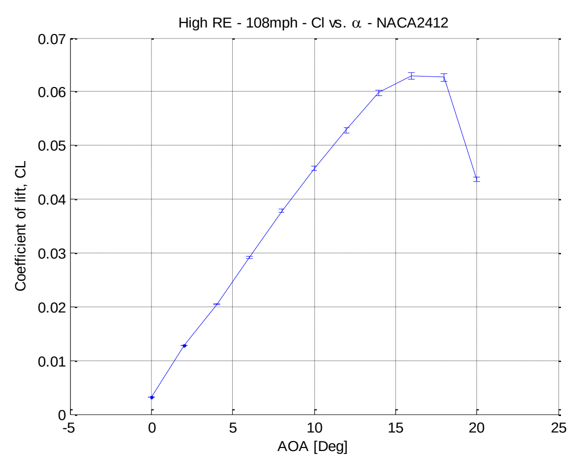




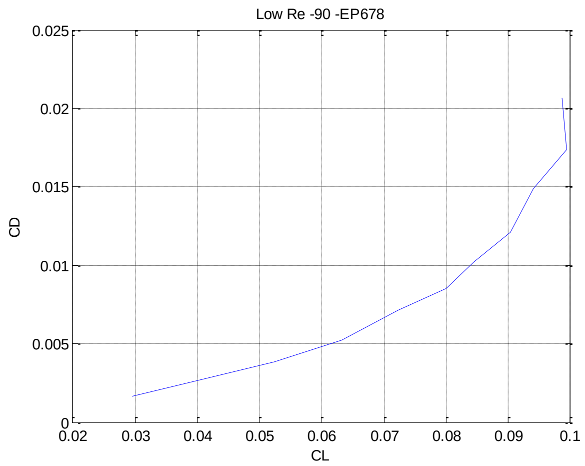


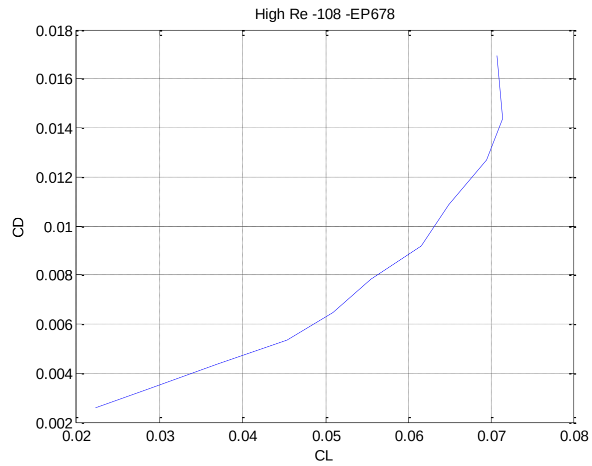


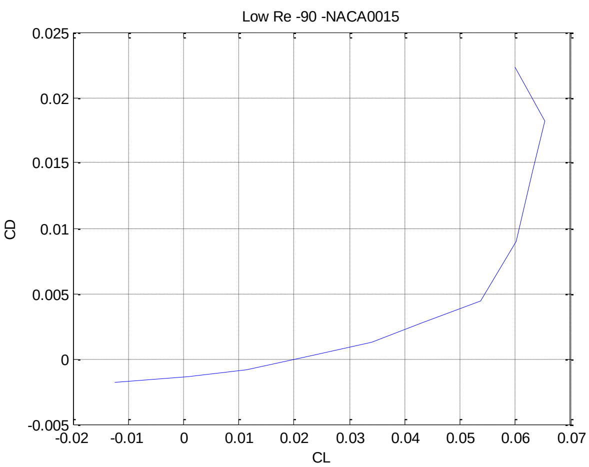


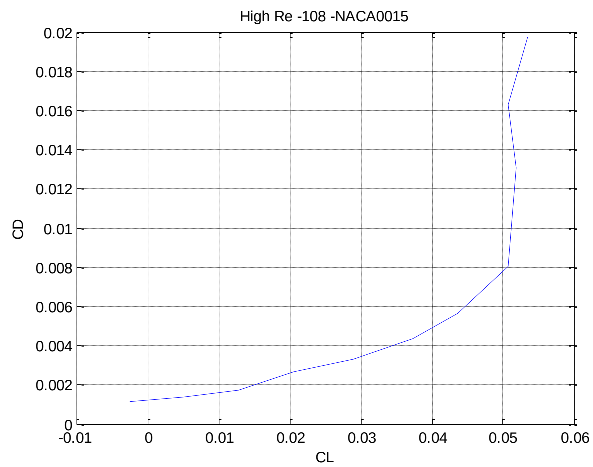


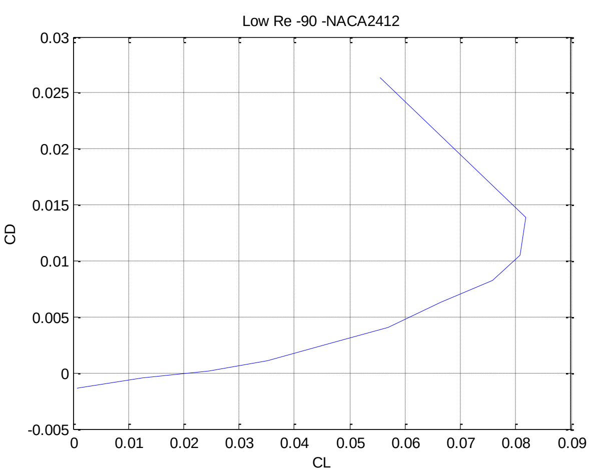
Another important metric that can be gleaned from lift and drag data is the drag polar. From this, the minimum drag coefficient can be pinpointed.











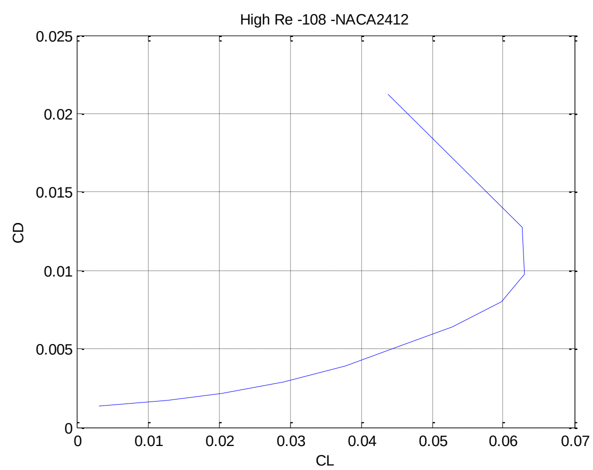


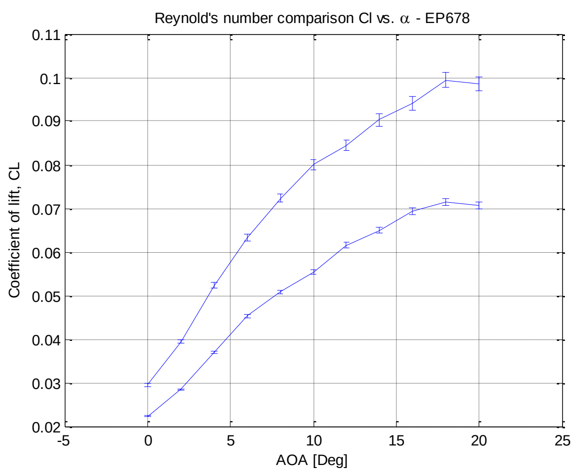
Table 1 compares several factors associated with each airfoil and in each test case.

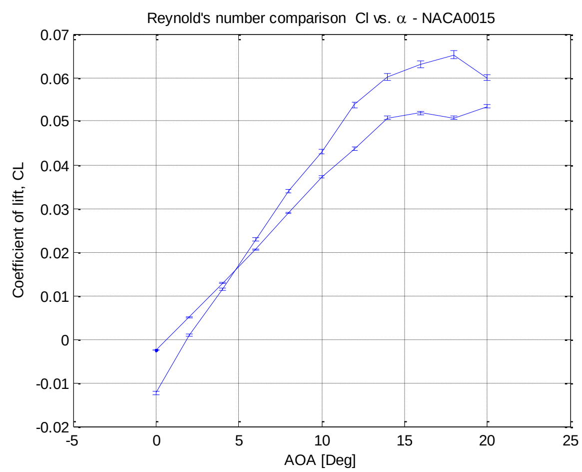
Airfoil	speed	Clmax	Cdmin	L/Dmax	alpha-stall
EP678	90	0.099377	0.001643	17.94646	18
	108	0.071383	0.002607	8.59514	18
NACA0015	90	0.065261	-0.0018	98.93101	18
	108	0.053388	0.001127	8.708673	20
NACA2412	90	0.081812	-0.00134	177.5973	18
	108	0.06297	0.001325	10.09798	16

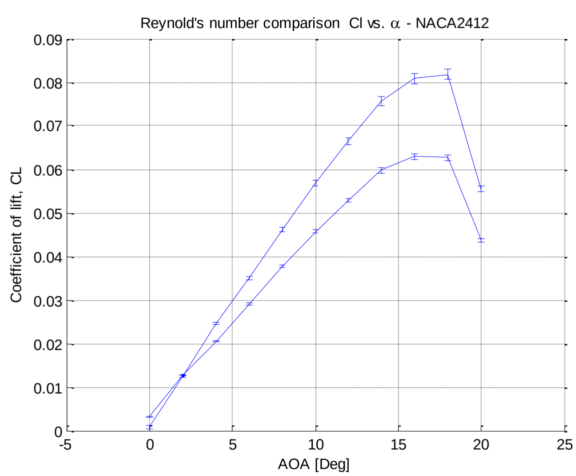
Clearly, the EP678 produces a much higher lift coefficient, and stalls at a higher angle of attack. Therefore, the EP678 would be the best of the three for a high lift application. However, if the goal is high speed, a symmetrical airfoil such as the 0015 would be best.

<u>Task 3:</u>

Each airfoil was tested at two Reynold's different numbers. At 90 mph, the Reynolds number is about 257000, while at 108 mph, the Reynold's number is about 309000. Here, the same lift curves from task 2 are plotted, but the Reynolds number cases are compared for each airfoil.







The differences in the lift curves do not seem to depend on Reynold’s number to a gigantic degree, with the exception of the EP678. For that airfoil, the coefficient of lieft seems to increase with Reynold’s number.