Sprint 5 Optimization Code Comments  
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1. This is the classic definition of Reynolds number:
2. NeuralFoil is a ML approximation of XFOIL. This is quick and accurate enough for these purposes. No significant runtime difference is observed with different model sizes. https://github.com/peterdsharpe/NeuralFoil
3. This is the classic lift formula
4. An approximation for Oswald efficiency factor can be found here: <https://calculator.academy/oswald-efficiency-factor-calculator/>
5. Formulae for induced and parasite drag can be found here: <https://aviation.stackexchange.com/questions/36062/what-is-the-formula-for-induced-drag>. Induced drag is still positive for negative lift (i.e. horizontal stabilizer)
6. Tails are normally an upside down airfoil. To model this, we model a right-side-up airfoil, which also calls for the AoA to be correspondingly negated. The sign of the lift is negative in the output to account for both of these reversals in combination.
7. Recall the discussion of CD0 power regression in the 1/28 slideshow
8. Vertical stabilizer has no lift, and thus also has no induced drag.
9. I believe that we will be operating at the upper limit of the mass budget, therefore, it does not make sense to relate this to other parameters for now. This will be an area of ongoing improvement. This also makes the CG purely a structures responsibility.
10. Static margin was calculated using this formula. <https://en.wikipedia.org/wiki/Longitudinal_stability>. The 0.5 coefficient approximates the partial derivative of downwash angle with respect to angle of attack, which is a hefty calculation from first principles.
11. There is some mis-match of variable types in the class definition. This is an ongoing work