Homework #3 **MEAM 5460 - Spring 2023**
Assigned: 03/16/2023, Due: 03/22/2023

There is a new VTOL related program in the company and your technical lead engineer wants you to contribute at the Preliminary Design (PD) stage of the program. To get you started she has assigned you the task of developing a tool to predict the variation of thrust and power of a rotor in hover. Specifically, she wants you to develop the tool to be able to showcase total thrust and power of the rotor as well as their respective spanwise distributions. Since you gunning for that promotion, you take it upon yourself to develop a Blade Element Momentum Theory (BEMT) based tool and plan to test by analyzing a 30 ft radius rotor with an ideal twist distribution and constant chord (2 ft) operating at a tip speed of 650 ft/sec (MSL density = 0.002378 sl/ft^3) using a linear thin airfoil assumption (lift curve slope = 2*pi). To keep things simple, you are not including any tip loss corrections (for now) and are considering the variation as a function of input collective (at 75% radial location). As a cross-check you are comparing your results against momentum theory results (rotor “disk” model). Your technical lead engineer prefers data in non-dimensional form (it helps her understand trends better).