A helicopter has a gross weight of 69,750 lb. and radius, \( R = 39.5 \) ft. The tip speed is \( \Omega R = 732 \) ft/sec. The helicopter is operating on a standard day in which \( \rho = .00238 \) slugs/ft\(^3\).

a.) What is the \( C_T \) of this machine?

b.) What is the power (in horsepower) required to hover assuming there is uniform inflow and a figure of merit = 1.0, and what is the corresponding \( C_P \)? (Note: 1 hp = 555 ft-lbf/sec. = 746 Watts). What is the corresponding uniform inflow velocity at the rotor disk in ft/sec?

c.) Assume that the induced flow in hover is not uniform, but is given by

\[ \mathbf{V} = \mathbf{V}_t \mathbf{r} \]

where \( r = x/R \) and \( \mathbf{V}_t \) is the induced-flow ratio at the tip. Find the inflow in ft/sec as a function of \( r \) for this case? (You should plot the velocity for \( 0 < r < 1 \).) What is the power required to hover with this inflow assuming no other losses? Give your answer in Horsepower. What is the figure of merit of this system?

d.) How many horsepower would be required for this helicopter to hover if the figure of merit were 0.75?