1. Givens: A/C @ 16,000 ft

$V = 252$ kt/s

$T_{A\,max} = 319$ lb

Drag $= 93$ lb

$W = 3737$ lb

max R/C that it could sustain @ this speed?

$$R/C = \frac{V \cdot (T - D)}{W}$$

Using given conditions:

$$R/C = \frac{252 \text{ ft/s} \cdot (319\text{lb} - 93\text{lb})}{3737 \text{ lb}}$$

$$= 15.2 \frac{\text{ft}}{\text{s}} = 914.4 \frac{\text{ft}}{\text{min}}$$

2. Givens:

$b = 119$ ft

$S = 737$ ft^2

$C_{D_p} = 0.02$

$e = 0.8$

$W = 247{,}115$ lb

Sea level conditions

$V_{prmin} = ?$

$\rho = 0.00237$ slug/ft^3

$$V_{prmin} = \sqrt{\frac{2W}{\rho S}\sqrt{\frac{K}{3C_{D_p}}}} \quad \& \quad K = \frac{1}{\pi AR e}$$

thus, $AR = b^2/S = (119\text{ ft})^2/737\text{ ft}^2$

$= 19.3$

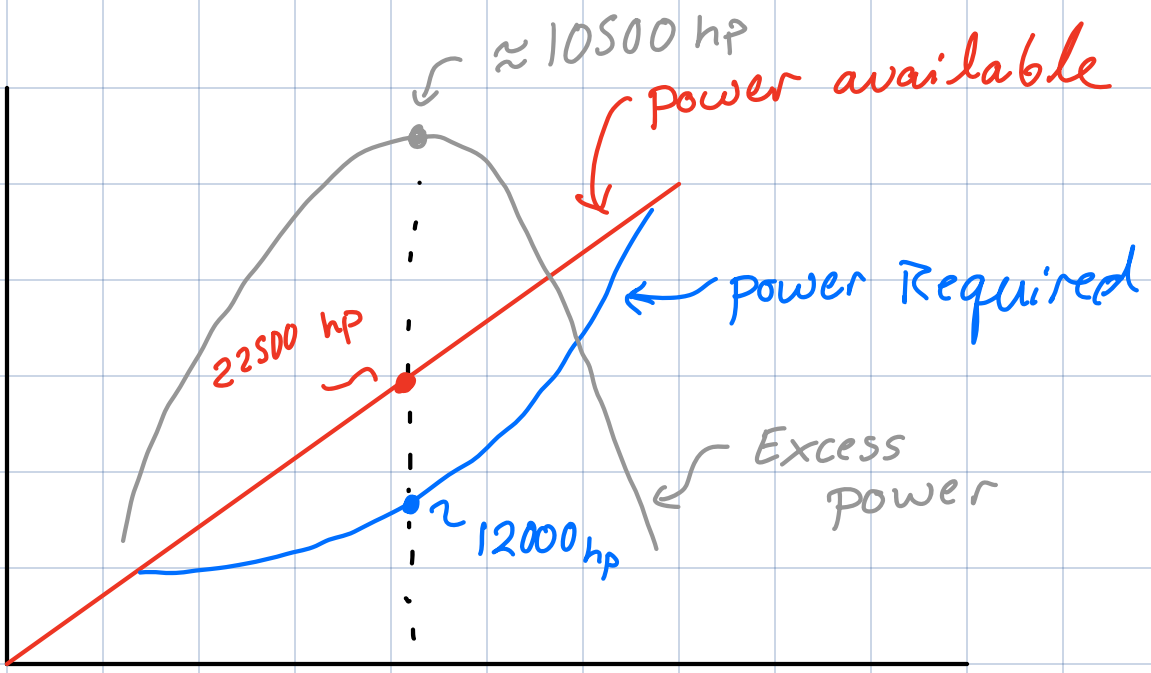
So $K = \frac{1}{19.3 \cdot \pi \cdot 0.8} = 0.0206$

then $V_{prmin} = \sqrt{\frac{2(247115\text{ lb})}{0.00237 \frac{\text{slug}}{\text{ft}^3} \cdot 737\text{ ft}^2}} \sqrt{\frac{0.0206}{3 \cdot 0.02}}$

$= 407.17$ ft/s $\cdot \frac{60}{88} = 277$ mph

ft/s to mph conversion

3.



A/C has weight 73,000 lb.

$R/C_{max} = ?$

R/C_{max} occurs when excess power is maximum.

$$\text{then } R/C_{max} = \max\left[\frac{P_A - P_R}{W}\right] = \frac{\max \text{Excess PwR}}{W}$$

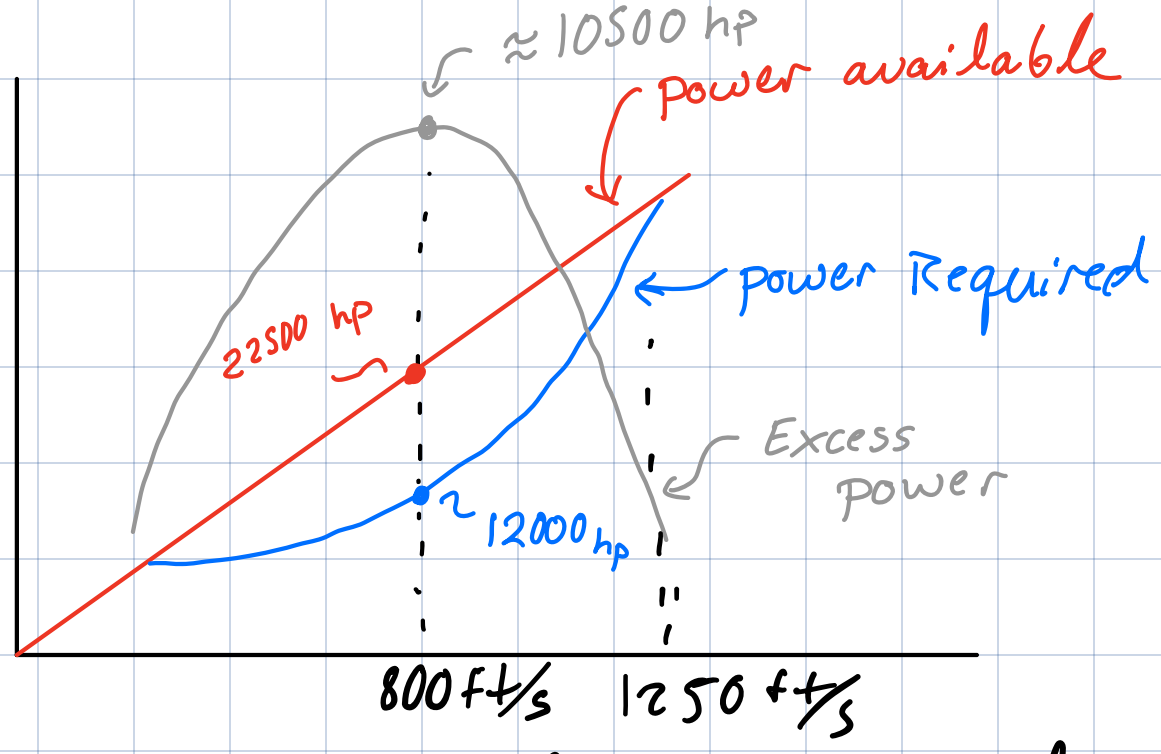
$$= \frac{22500\ hp - 12000\ hp}{73000\ lb} = \frac{10500\ hp}{73000\ lb} \times 550$$

↑ hp to $\frac{ft\text{-}lb}{s}$

$$= 79.1 \frac{ft}{s} \times 60$$

$$= \underline{4746\ ft/min}$$

4.



a. max R/C velocity is velocity @ max excess power

~ 800 ft/s

b. max speed is max speed where $P_R = P_A$

~ 1250 ft/s