Week 8 Quiz

1. Not $C_L/C_{D|max}$?

- prop longest distance glide → needs L/D_{max}
- jet longest Range → needs $C_L^{1/2}/C_{D\,max}$
- prop longest Range → needs L/D_{max}
- jet longest endurance → needs L/D_{max}

∴ 2nd option is correct case

2. Not $C_L^{3/2}/C_{D\,max}$?

- Prop flying @ min power Required $C_L^{3/2}/C_{D\,max}$ needed
- Jet descending @ slowest Rate → $C_L^{3/2}/C_{D\,max}$ needed
  i.e. min V_V
- Prop longest distance glide → $C_L/C_{D\,max}$ needed
- Prop longest endurance → $C_L^{3/2}/C_{D\,max}$

∴ option 3 is correct case

3. givens: jet A/C

$C_T = 0.6$ lb/lb-hr

$L/D = 10.2$

$W_0 = 94260$ lb

$E = 2$ hrs

total fuel burned?

Jet Endurance: $E = \frac{1}{C_T} \cdot \frac{L}{D} \cdot \ln\left(\frac{W_0}{W_1}\right)$

fuelburn $= W_0 - W_1$ thus,

$W_1 = W_0 - W_{FBurn}$

$$\rightarrow \frac{E \cdot C_T}{L/D} = \ln\left(\frac{W_0}{W_0 - W_{FB}}\right)$$

$$\rightarrow e^{\left(\frac{E \cdot C_T}{L/D}\right)} = \frac{W_0}{W_0 - W_{FB}}$$

$$W_{FB} = W_0 - \frac{W_0}{e^{\left(\frac{E \cdot C_T}{L/D}\right)}}$$

$$= 94260 \text{ lb} - \frac{94260 \text{ lb}}{e^{\left(\frac{2 \text{ hr} \cdot 0.6 \text{ lb/lb-hr}}{10.2}\right)}}$$

$$= \underline{10{,}461 \text{ lb fuel burn}}$$

Standard Sea level atmosphere

4. Givens:

$V_2 = 1.2\,V_{stall}$

$W = 90758\ lb$

$S = 937\ ft^2$

$s_g = 6005\ ft$

$a_{0.7V_2} = 4\ ft^2/s$

$C_{L_{max}}$?

$$s_g = V_2^2 / 2 \cdot a_{0.7V_2} \quad \& \quad V_2 = 1.2\,V_{stall}$$

$$V_{stall} = \sqrt{\frac{2W}{\rho S C_{L_{max}}}} \quad \text{thus,}$$

$$\frac{\sqrt{s_g \cdot 2 \cdot a_{0.7V_2}}}{1.2} = V_{stall} = \frac{\sqrt{(6005\,ft)\cdot 2 \cdot 4\,\frac{ft}{s^2}}}{1.2}$$

$$= 182.6\ ft/s$$

$$\text{then } C_{L_{max}} = \frac{2(90758\,lb)}{\left(0.00238\,\frac{slug}{ft^3}\right)(937\,ft^2)(182.6\,ft/s)^2} \cdot \frac{1}{}$$

$$= \underline{2.44}$$