Ryan's Massive Brain

Schrenk Aprox:

$$\cancel{(V_{cruise} \cdot 1.688)^2 \cdot r_{cruise} \cdot S \cdot C_{L_{cruise}} \cdot \left(C + \left(\frac{4S}{\pi \text{ Wingspan}}\right.\right.} \cdot$$

$$(V_{cruise} \cdot 1.688)^2 \cdot r_{cruise} \cdot S \cdot C_{L_{cruise}} \cdot \left[C + \frac{4S}{\pi b} \cdot \sqrt{1 - \left(\frac{2 \cdot x}{12 \cdot b}\right)^2} \right]$$

Wingspan. C.4

Abreviations → I think this was just for the spreadsheet version w/ the righthand sum

V_{cruise}: Cruise Speed = 46 knots

r_{cruise}: Cruise Air Density = 6.59×10^{-2} $lb\,ft^{-3}$

S : Wing Reference Area = 192 ft^2

$C_{L_{cruise}}$: Lift Coeficient @ Cruise = 0.424

C : Chord : 6 ft

b : Wing Span : 32 ft

#s:

1.688 : knots to ft/s

12 b : ft to inches

other explination
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Original Schrenk Aproximation:

$$\frac{4S}{\pi b}\sqrt{1-\left(\frac{2y}{b}\right)^2} = a$$

b = wing span

S = wing area

so that's the OG
-gives it in terms of cCl_a (wing chord; local lift coefficient for global lift $C_L=1$) so to turn it into lift

Ryan's equasion

$$\frac{(V_{cruise}\cdot 1.688)^2 \cdot r_{cruise}\cdot S\cdot C_{Lcruise}\cdot C\cdot a}{b\cdot c\cdot 4}$$

Need to divide by our lift coefficient @ Cruise & Chord

Lift Coefficient

$$C_l = \frac{2L}{\rho V^2 A}$$

← lift; A → S; ρ → r_{crivse}; V → cruise velocity

divide by lift coeficient then solve for L

making it 3D but no we have to take integral first of) then cross section it w/ chord-wise lift Distribution

OG Schrenk

$$\frac{[(V_{cruise})1.688]^2\cdot r_{cruise}\cdot S\cdot C_{Lcruise}\cdot C\ a}{b\cdot C\cdot 4}$$

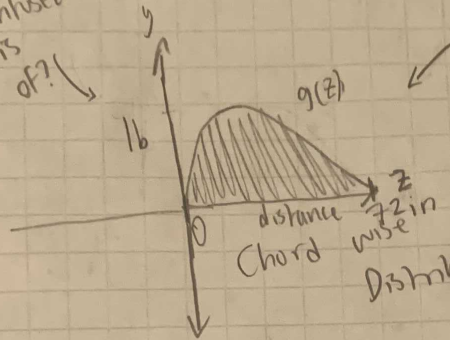
why not 2?

?
Per inch maybe? like taking right hand sum? - so just get rid of it for integral?

bc og in terms of cCl so must divide out

Schrenk Aprox & Chord-wise Lift Distribution = total Lift generated by Wing

a little confused what this is in terms of?

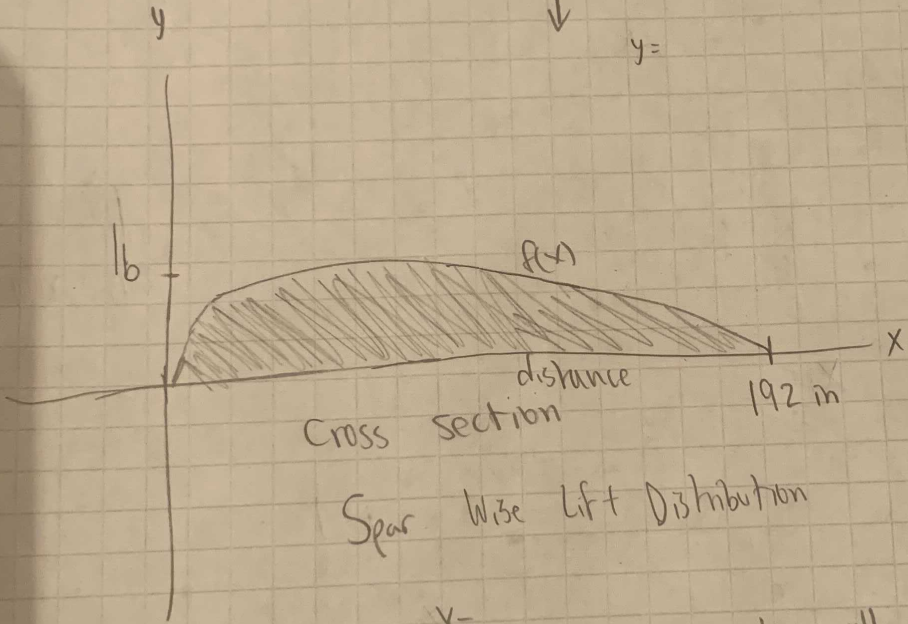


Chord wise Distribution

height in terms of schrenk aprox

then just extrude it 192 in

y =



Cross section

Spar Wise Lift Distribution

Y =

basically, x determines the y of f(x)

x & z plotted to find y of g(z)

3D integrals? are those a thing?

$$\int_0^{72} 192\, g(z)\, d\_$$

not sure? x or z?

in terms of f(x)