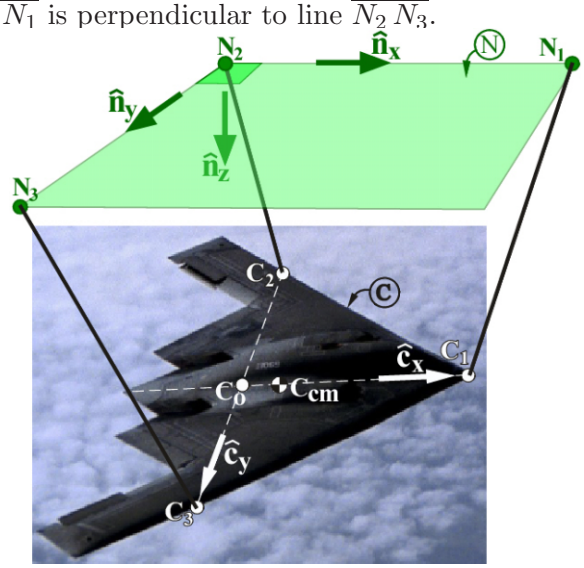
22.12 † Cable lengths to keep an aircraft horizontal and stationary.

The following figure shows a rigid aircraft C supported by three thin (massless) inextensible taut cables to an aircraft hanger's flat horizontal roof N (a Newtonian reference frame). The cables attach to N at points N_1, N_2, N_3, and attach to C at points C_1, C_2, C_3. Point C_o of C is the midpoint of C_2 and C_3. Line $\overline{C_o\,C_1}$ is perpendicular to line $\overline{C_2\,C_3}$. Line $\overline{N_2\,N_1}$ is perpendicular to line $\overline{N_2\,N_3}$.

Quantity	Symbol	Value
Distance between N_2 and N_1	d_N	30 m
Distance between N_2 and N_3	w_N	40 m
Distance between C_o and C_1	d_C	30 m
Distance between C_2 and C_3	w_C	40 m
Distance between C_o and C_{cm}	d_{cm}	8 m
Length of cable $\overline{C_1\,N_1}$	L_1	20 m
Length of cable $\overline{C_2\,N_2}$	L_2	18.48 m
Length of cable $\overline{C_3\,N_3}$	L_3	18.82 m



Note: C_{cm} is C's center of mass and is along line $\overline{C_o\,C_1}$.

Calculate L_2 and L_3 so the aircraft is stationary and horizontal (i.e., the horizontal roof containing N_1, N_2, N_3 is parallel to the horizontal plane containing C_o, C_1, C_2, C_3, C_{cm}).

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