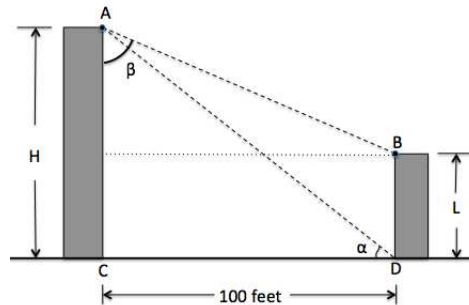**5.** [9 points] Jimmy is at the top of a building at point A (see the diagram below). He is trying to determine the heights H and L of the building at which he is standing and another building that is 100 feet away. He finds out that the angles $\alpha = ADC$ and $\beta = BAC$ measure $37°$ and $65°$ respectively.

a. [2 points] Find a formula for the length of the segment AD in terms of the height H of the building at which Jimmy is standing.

Solution: $AD = \sqrt{100^2 + H^2}$.

b. [3 points] Find the height H of the building in which Jimmy is standing. Include units. Your answer must be exact or include at least two decimals. Show all your work.

Solution: $\tan \alpha = \dfrac{H}{100}$, then $H = 100 \tan(37^o) \approx 75.35$ feet.

c. [4 points] Find the height L of the building that is 100 feet away. Include units. Your answer must be exact or include at least two decimals. Show all your work.

Solution: Since $\tan \beta = \dfrac{100}{H - L}$, then $H - L = \dfrac{100}{\tan \beta}$.

Hence $L = H - \dfrac{100}{\tan \beta} \approx 28.72$ feet.