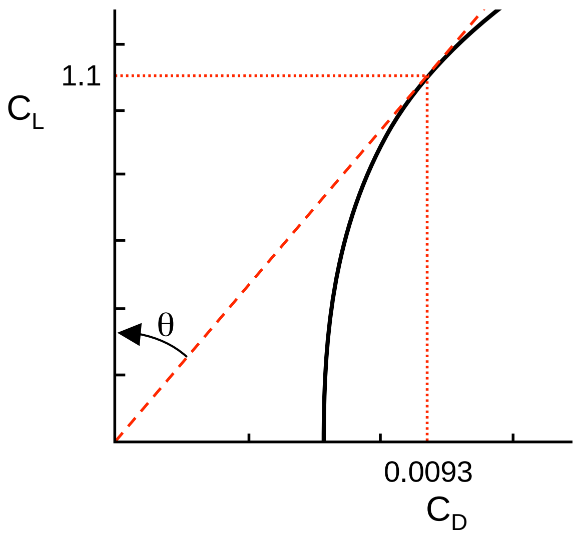
Solution to Problem 292B

1. From the graph, stall occurs at about $C_L = 1.72$. For horizontal flight, the lift must be balanced by the weight.

$$\begin{aligned}
\frac{1}{2}\rho U^2 A C_L &= 2000 \ kg \ m/s^2 \\
u &= \sqrt{\frac{2(2000 \ kg \ m/s^2)}{\rho A C_L}} \\
&= \sqrt{\frac{2(2000 \ kg \ m/s^2)}{(1 \ kg/m^3)(10 \ m^2)(1.72)}} \\
&= 15.2 \ m/s
\end{aligned}$$

2. The glide angle,

$$\theta = \tan^{-1}\left(\frac{C_D}{C_L}\right)$$



has a minimum met by the conditions at the point where $C_L = 1.1$, $C_D = 0.0093$. Therefore the minimum glide angle is approximately $0.48°$. [Note: If the fuselage drag was included, this angle would be much larger.] In gliding,

$$\begin{aligned}
L &= W \times \cos\theta \\
\frac{1}{2}\rho u_T^2 A C_L &= (2000 \ kg \ m/s^2)\cos(0.48°) \\
u_T &= 19.1 \ m/s
\end{aligned}$$

where u_T is the total velocity. Therefore, the horizontal velocity is $u_T \cos(0.48°) = 19.0 \ m/s$