v) $n = 8$, $C_1 = 8.74$, $m = \frac{n+1}{2}$, $C_2 = 2C_1^{-2m/m+1}$

$$C_f = 2\left(\frac{n}{(n+1)(n+2)}\right)\frac{d\delta}{dx}$$

$$C_f = \frac{C_2}{Re_\delta^{1/m}}$$ where

$$Re_\delta = (Re_x)\left(\frac{\delta}{x}\right)$$

equate and solve for $\delta(x)$

$$\frac{d\delta}{dx}\,2\left(\frac{n}{(n+1)(n+2)}\right) = \frac{C_2}{Re_\delta^{1/m}}$$

$$\frac{d\delta}{dx}\,2\,\frac{n}{(n+1)(n+2)} = \frac{C_2}{(Re_x)^{1/m}\left(\delta/x\right)^{1/m}}$$

$$\int_0^\delta \delta^{1/m}\,d\delta = \int_0^x \frac{(n+1)(n+2)\,C_2}{2n\left(\frac{\rho U}{\nu}\right)^{1/m}\left(\cancel{\frac{x}{x}}\right)^{1/m}}\,dx$$

$$\frac{1}{\frac{1}{m}+1}\,\delta^{\frac{1}{m}+1} = x\,\frac{(n+1)(n+2)\,C_2}{2n\left(\frac{\rho U}{\nu}\right)^{1/m}}$$

$$\delta(x) = x\left(\frac{(n+1)(n+2)\,C_2}{2n\left(\frac{\rho U}{\nu}\right)^{1/m}}\left(\frac{1}{m}+1\right)\right)^{\frac{m}{m+1}}$$

a) $$\frac{\delta_1}{\delta} = \int_0^n \left(1-\frac{u}{U}\right)d\left(y/\delta\right) = \frac{1}{n+1} = \boxed{1/9}$$

b) $\boxed{\delta(x) - \text{see derivation} ,\ \delta_1 = \delta\ 1/9}$

c)

$$C_f = C_2\,\frac{1}{(Re_x)^{1/m}\left(\delta(x)/x\right)^{1/m}}$$

looking at only the denomitar

$$(Re_x)^{1/m} \left(x^{\frac{m}{m+1}-1} \left(\frac{\rho U}{\nu}\right)^{-\frac{1}{m+1}} \left(\frac{(m+1)(m+2) C_2 m}{2m(m+1)} \right)^{\frac{m}{m+1}} \right)^{1/m}$$

$$x^{\frac{m}{m+1}-1} = x^{\frac{m}{m+1} - \frac{m+1}{m+1}} = x^{-\frac{1}{m+1}}$$

$$(Re_x)^{1/m} \left((Re_x)^{-1/m+1} \left(\frac{(m+1)(m+2) C_2 m}{2m(m+1)} \right)^{m/m+1} \right)^{1/m}$$

$$C_f = \frac{C_2}{(Re_x)^{1/m - \frac{1}{m^2+m}} \left(\frac{(m+1)(m+2) C_2 m}{2m(m+1)} \right)^{1/m+1}}$$

$$C_f = \boxed{\frac{0.0375}{Re_x^{2/11}}}$$

$$C_L = \frac{1}{L} \int_0^L C_f \, dx = \boxed{\frac{0.0458}{Re_x^{2/11}}}$$

$$\boxed{\begin{aligned} D &= C_L \tfrac{1}{2} \rho U^2 A \\ P &= D \cdot U \end{aligned}}$$