Gwen Quarlc

7.2: $P = -\frac{dU}{dV} = -\frac{d}{dV}(N\bar{\varepsilon})$

$= -\frac{d}{dV}\left(\frac{3}{5}N E_F\right)$

$= -\left(\frac{3}{5}N\right)\frac{dE_F}{dV}$

We know, $E_F = \frac{\hbar^2}{2m}\left(\frac{3\pi^2 N}{V}\right)^{2/3} = C V^{-2/3}$

$\frac{dE_F}{dV} = C\left(-\frac{2}{3}\right)V^{-5/3} = \left(-\frac{2}{3}\right)V^{-1} C V^{-2/3}$

$= \left(-\frac{2}{3}\right)V^{-1} E_F$

$\Rightarrow P = -\left(\frac{3}{5}N\right)\left(-\frac{2}{3}\right)\frac{1}{V} E_F$

$= \boxed{\frac{2}{5}\frac{N}{V} E_F}$