Problem Set 16 Solutions

ENAE 483/788 D - Fall, 2005

a) \( p_P N_2 = (14.7 \text{ psi})(0.79) = 11.61 \text{ psi} \)

\[
R = \frac{ppN_2}{P_{\text{total (new)}}} = \frac{11.61}{3.75} = 3.097
\]

b) \( p_{\text{suit}} = \frac{ppN_2}{R} = \frac{11.61}{1.5} = 7.74 \text{ psi} \)

c) \( ppN_2 = p_{\text{suit}}R = 1.4(3.75) = 5.25 \text{ psi} \)

This sets \( N_2 \) pressure - we can't find the cabin pressure without a specification for \( ppO_2 \)
(sorry about that...)

d) \( ppO_2 = (14.7 \text{ psi})(0.21) = 3.087 \text{ psi} \)

Total cabin pressure (for (c)) is \( 5.25 + 3.087 = 8.337 \text{ psi} \)

\( O_2/N_2 \) mixture ratio = \( \frac{3.087 \text{ psi}}{5.25 \text{ psi}} = 0.588 \)

→ alternate statement: \( O_2 = \frac{3.087}{8.337} = 37\% \)

\( N_2 = \frac{5.25}{8.337} = 63\% \)