1.36

1.36 A tire having a volume of 2.5 ft^3 contains air at a gage pressure of 30 psi and a temperature of 70 °F. Determine the density of the air and the weight of the air contained in the tire.

$$\rho = \frac{p}{RT} = \frac{\left(30 \frac{lb}{in.^2} + 14.7 \frac{lb}{in.^2}\right)\left(144 \frac{in.^2}{ft^2}\right)}{\left(1716 \frac{ft \cdot lb}{slug \cdot {}^\circ R}\right)\left[(70^\circ F + 460)^\circ R\right]} = \underline{\underline{7.08 \times 10^{-3} \frac{slugs}{ft^3}}}$$

$$weight = \rho g \times volume = \left(7.08 \times 10^{-3} \frac{slugs}{ft^3}\right)\left(32.2 \frac{ft}{s^2}\right)\left(2.5\, ft^3\right)$$

$$= \underline{\underline{0.570\ lb}}$$