

ORIGIN := 1

$$y_{\text{CO}} := 0.1 \quad y_{\text{H}_2} := 0.3 \quad y_{\text{CH}_4} := 0.1 \quad y_{\text{H}_2\text{O}} := 0.3 \quad y_{\text{CO}_2} := 0.1 \quad n := 5$$

Given

$$1.45 = \frac{y_{\text{CO}_2} \cdot y_{\text{H}_2}}{y_{\text{CO}} \cdot y_{\text{H}_2\text{O}}}$$

$$0.64 = \frac{y_{\text{CO}_2}}{y_{\text{CO}}^2}$$

$$0.13 = \frac{y_{\text{CO}_2}^3 \cdot y_{\text{CH}_4}}{y_{\text{CO}}^4 \cdot y_{\text{H}_2\text{O}}^2}$$

$$y_{\text{CH}_4} + y_{\text{H}_2\text{O}} + y_{\text{CO}} + y_{\text{H}_2} + y_{\text{CO}_2} = 1$$

$$2y_{\text{CO}_2} + y_{\text{CO}} + y_{\text{H}_2\text{O}} = \frac{5}{n}$$

$$2y_{\text{H}_2} + 2y_{\text{H}_2\text{O}} + 4y_{\text{CH}_4} = \frac{6}{n}$$

$$\text{Find}(y_{\text{CO}_2}, y_{\text{CO}}, y_{\text{H}_2}, y_{\text{H}_2\text{O}}, y_{\text{CH}_4}, n) = \begin{pmatrix} 0.123 \\ 0.438 \\ 0.358 \\ 0.069 \\ 0.012 \\ 6.643 \end{pmatrix}$$