$ORIGIN := 1$

$T := 313.2 \qquad R := 83.14 \qquad P := \begin{pmatrix} 44.4 \\ 70.8 \end{pmatrix} \qquad x_2 := \begin{pmatrix} 0.099 \\ 0.150 \end{pmatrix}$

$T_c := 190.6 \qquad P_c := 46.1 \qquad \omega := 0.011$

$$root(p, q, r) := \left| \begin{array}{l} v \leftarrow \begin{pmatrix} r \\ q \\ p \\ 1 \end{pmatrix} \\ r \leftarrow polyroots(v) \\ \text{for} \quad i \in 1 .. 3 \\ \quad r_i \leftarrow 0 \quad \text{if} \quad \left| Im(r_i) \right| > 0 \\ \begin{pmatrix} max(r) \\ min(r) \end{pmatrix} \end{array} \right.$$

$$f(T, P) := \left| \begin{array}{l} T_r \leftarrow \dfrac{T}{T_c} \\ P_r \leftarrow \dfrac{P}{P_c} \\ \alpha \leftarrow \left[1 + \left(0.37464 + 1.54226\omega - 0.26992\omega^2\right) \cdot \left(1 - \sqrt{T_r}\right) \right]^2 \\ A \leftarrow 0.45724 \cdot \dfrac{P_r \cdot \alpha}{T_r^{\,2}} \\ B \leftarrow 0.07780 \cdot \dfrac{P_r}{T_r} \\ p \leftarrow -1 + B \\ q \leftarrow A - 2B - 3B^2 \\ r \leftarrow -A \cdot B + B^2 + B^3 \\ Z \leftarrow root(p, q, r)_1 \\ \Theta \leftarrow \dfrac{A}{\sqrt{8} \cdot B} \cdot \ln\left[\dfrac{Z + \left(1 + \sqrt{2}\right) \cdot B}{Z + \left(1 - \sqrt{2}\right) \cdot B} \right] \\ \phi \leftarrow \exp\left(Z - 1 - \ln(Z - B) - \Theta\right) \\ f \leftarrow \phi \cdot P \\ f \end{array} \right.$$

$X := 5 \qquad V := 5$

Given

$$\ln\left(\frac{f(T, P_1)}{x_{2_1}}\right) = X + \frac{V}{R \cdot T} \cdot P_1$$

$$\ln\left(\frac{f(T, P_2)}{x_{2_2}}\right) = X + \frac{V}{R \cdot T} \cdot P_2$$

$$\begin{pmatrix} X \\ V \end{pmatrix} := \text{Find}(X, V) = \begin{pmatrix} 6.013 \\ 7.814 \end{pmatrix}$$

$x_2 := 0.1$

Given

$$\ln\left(\frac{f(T, 55.3)}{x_2}\right) = X + \frac{V}{R \cdot T} \cdot 55.3$$

$\text{Find}(x_2) = 0.121$