EXAMPLE 6.5

$ORIGIN := 1$

$$T_c := \begin{pmatrix} 190.6 \\ 305.3 \end{pmatrix} \qquad P_c := \begin{pmatrix} 46.1 \\ 49 \end{pmatrix} \qquad y := \begin{pmatrix} 0.90 \\ 0.10 \end{pmatrix} \qquad k := \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$R := 8.314$

$$C_{P1}(T) := 36.155 - 0.511 \cdot 10^{-1} \cdot T + 2.215 \cdot 10^{-4} T^2 - 1.824 \cdot 10^{-7} T^3 + 4.899 \cdot 10^{-11} T^4$$

$$C_{P2}(T) := 33.313 - 0.111 \cdot 10^{-1} \cdot T + 3.566 \cdot 10^{-4} T^2 - 3.762 \cdot 10^{-7} T^3 + 11.983 \cdot 10^{-11} T^4$$

$$root(p, q, r) := \left| \begin{array}{l} v \leftarrow \begin{pmatrix} r \\ q \\ p \\ 1 \end{pmatrix} \\ x \leftarrow polyroots(v) \\ \text{for } i \in 1 .. 3 \\ \quad x_i \leftarrow 0 \text{ if } Im(x_i) \neq 0 \\ x1 \leftarrow max(x) \\ y \leftarrow min(x) \\ x2 \leftarrow \left| \begin{array}{ll} max(x) & \text{if } y = 0 \\ y & \text{otherwise} \end{array} \right. \\ \begin{pmatrix} x1 \\ x2 \end{pmatrix} \end{array} \right.$$

$$\text{HDep}(T, P) := \left| \begin{array}{l} \text{for } i \in 1 .. 2 \\ \quad T_{r_i} \leftarrow \dfrac{T}{T_{c_i}} \\ \quad P_{r_i} \leftarrow \dfrac{P}{P_{c_i}} \\ \quad A_{i,i} \leftarrow 0.42748 \left[\dfrac{P_{r_i}}{\left(T_{r_i}\right)^{2.5}} \right] \\ \quad B_i \leftarrow 0.08664 \cdot \dfrac{P_{r_i}}{T_{r_i}} \\ \text{for } i \in 1 .. 2 \\ \quad \text{for } j \in 1 .. 2 \\ \quad\quad A_{i,j} \leftarrow \left(1 - k_{i,j}\right) \cdot \sqrt{A_{i,i} \cdot A_{j,j}} \\ A_{mix} \leftarrow \sum_{i=1}^{2} \sum_{j=1}^{2} \left(y_i \cdot y_j \cdot A_{i,j}\right) \\ B_{mix} \leftarrow \sum_{i=1}^{2} \left(y_i \cdot B_i\right) \\ p \leftarrow -1 \\ q \leftarrow A_{mix} - B_{mix} - B_{mix}^{2} \\ r \leftarrow -A_{mix} \cdot B_{mix} \\ Z \leftarrow \text{root}\left(p, q, r\right)_1 \\ H \leftarrow R \cdot T \cdot \left(Z - 1 - \dfrac{3}{2} \cdot \dfrac{A_{mix}}{B_{mix}} \cdot \ln\left(1 + \dfrac{B_{mix}}{Z} \right) \right) \\ H \end{array} \right.$$

$$C_P(T) := \begin{pmatrix} 36.155 - 0.511 \cdot 10^{-1} \cdot T + 2.215 \cdot 10^{-4} T^2 - 1.824 \cdot 10^{-7} T^3 + 4.899 \cdot 10^{-11} T^4 \\ 33.313 - 0.111 \cdot 10^{-1} \cdot T + 3.566 \cdot 10^{-4} T^2 - 3.762 \cdot 10^{-7} T^3 + 11.983 \cdot 10^{-11} T^4 \end{pmatrix}$$

$$I := \int_{310}^{350} y \cdot C_P(T)\ dT = 1.57374 \times 10^3$$

This is Eq. (6.1-31)

$$\Delta H := -HDep(310, 1) + HDep(350, 30) + I = 1.173 \times 10^{3}$$