(III) PROCESS 3→4

because isovol $W_{34} = 0$

and $v_4 = v_3$, $T_4 = 160°$ from this we use SLVM to find U_4

quality $x = \dfrac{v_4 - v_{f4}}{v_{g4} - v_{f4}} = \dfrac{0.19736 - 0.001102}{0.30678 - 0.001102} \cong 0.63223$

thus,

$U_4 = (1-x)U_f + xU_g$

$= 0.36777 \times 674.79 \dfrac{kJ}{kg} + 0.63223 \times 2567.8 \dfrac{kJ}{kg}$

$= 1871.61 \dfrac{kJ}{kg}$

$\therefore U_4 = 1871.61 \, kJ$

$\therefore Q_{34} = \Delta U_{34} = U_4 - U_3 = (1871.61 - 2582.7) kJ \cong -711.1 \, kJ$

$$\boxed{\begin{array}{l} W_{34} = 0 \\ Q_{34} = -711 \, kJ \end{array}}$$

(IV) Process 4→1

$U_{41} = U_1 - U_4 = (2575.1 - 1871.61) kJ \cong 703.5 \, kJ$

and because Q_{41} is given we know the work

$Q_{41} = U_{41} + W_{41}$

$\therefore W_{41} = 815.8 - 703.5$

$= 112.3$

$$\boxed{W_{41} = 112 \, kJ}$$

a bit off from

108 kJ

but for all calculations I used scientific significant figure operations.