Problem 12.2

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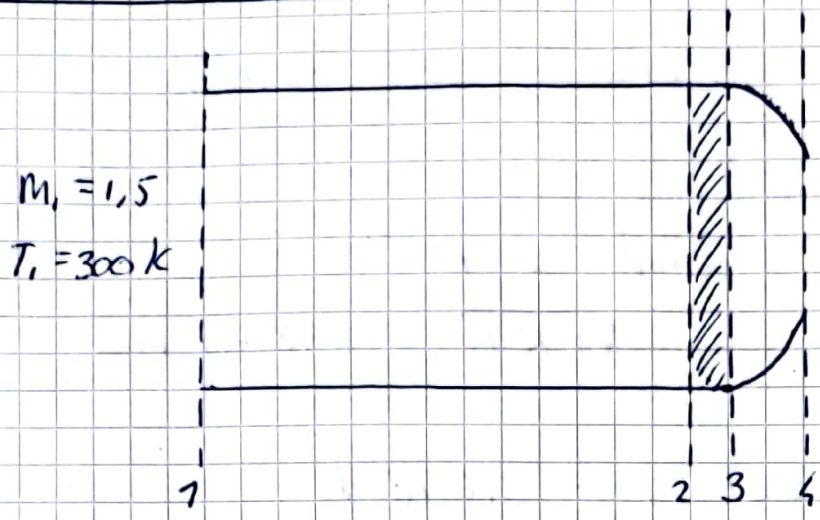
: shock



$$\frac{A^*}{A} = 0,5787^{-1}\ \frac{(1+0,2M_3^2)^{-3}}{M_3^{-1}} = 0,98$$

$\rightarrow M_3 = 0,98$ (isentropic flow)

$\rightarrow M_4 = 1,19$ (shock tables)

$$T_{t,1} = T_1(1+0,2M_1^2) = 435\ k$$

$$T_t^* = T_{t,1}\left[\frac{2(2,4)^2M_1^2}{(1+1,4M_1^2)^2}(1+0,2M_1^2)\right]^{-1}$$

$$T_t^* = 199,33\ k$$

$$T_{t,2} = T_t^*\left[\frac{2(2,4)^2M_2^2}{(1+1,4M_2^2)^2}(1+0,2M_2^2)\right]$$

$$T_{t,2} = 469\ k$$

$q = (T_{t,2} - T_{t,1})\,c_p$, where $c_p = \frac{\gamma R}{\gamma - 1} = 1004,67\ kJ/kgk$

$$\boxed{q = 34,16\ kJ}$$