In fact engine with aft burner off is just turbofan but with modified power balance.

Will do from scratch since part (a) goes through core.

\[
\frac{T_{eq_1}}{T_{q_1}} = 1 + \frac{\gamma - 1}{2} M_{q_1}^2 = \frac{T_{eq_1}}{T_{eq_2}} \frac{T_{eq_3}}{T_{eq_1}} \frac{T_{eq_3}}{T_{eq_2}} \frac{T_{eq_2}}{T_0} \frac{T_0}{T_{q_1}}
\]

\[
1 + \gamma - 1 \frac{M_{q_1}^2}{T_{q_1}} = \gamma c_0 T_T \frac{T_0}{T_{q_1}}
\]

\[
\frac{T_{q_1}}{T_0} = \gamma c_0 T_T \left(1 + \gamma - 1 \frac{M_{q_1}^2}{T_{q_1}}\right)^{-1}
\]

and

\[
\frac{P_{eq_1}}{P_{q_1}} = \left(1 + \gamma - 1 \frac{M_{q_1}^2}{T_{q_1}}\right)^{-\frac{\gamma - 1}{2}} = \frac{P_{eq_1}}{P_{eq_2}} \frac{P_{eq_2}}{P_{eq_3}} \frac{P_{eq_3}}{P_0} \frac{P_0}{P_{q_1}}
\]

\[
= \gamma c_0 T_T = (\gamma c_0 T_T) \frac{P_0}{P_{eq_1}}
\]

\[
1 + \frac{\gamma - 1}{2} M_{q_1}^2 = \gamma c_0 T_T
\]

\[
M_{q_1} = \sqrt{\frac{\gamma - 1}{2} \left(\gamma c_0 T_T - 1\right)}
\]