[mex17] Rocket motion in resistive medium

A rocket is launched from rest in a resistive medium $(F_{ext} = -\beta v)$ by burning fuel at a constant rate, $m = m_0(1 - \alpha t)$. The speed of the exhaust gases relative to the rocket is u.

(a) Calculate the velocity $v(t)$ of the rocket.

(b) Take the limit $\beta \to 0$ in the result of (a) to recover the result $v(t) = u \ln[m_0/m(t)]$.

Solution: