[mex224] Photon absorption and photon emission

(a) A photon of energy E is absorbed by a stationary atom of rest mass m_0 in a force-free environment. By what amount Δm_0 has the rest mass of the atom changed when it is in the excited state?

(b) A photon of energy E' is emitted by a stationary atom of rest mass m_0' in a force-free environment. By what amount $\Delta m_0'$ has the mass of the atom changed when it is back in the ground state?

(c) Express the energy of each photon in units of $m_0 c^2$ as a function of $\Delta m_0/m_0$ expanded two second order.

Solution: