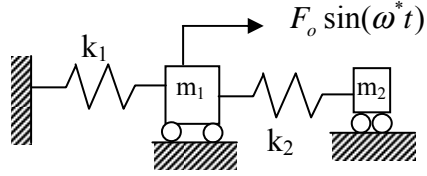5. The dynamic vibration absorber shown is "tuned" for minimum displacement of the main mass, m_1. Find the expression for the new natural frequencies of the total system as a function ω^* and the mass ratio m_1/m_2. Show that one of these frequencies will always be less than ω^* while the other will always be greater than ω^*.

$$\omega^* = \sqrt{\frac{k_1}{m_1}}$$