[mex240] Elastic collision: angle between scattered particles

A particle of mass m_1 and incident velocity $\bar{\mathbf{v}}_0$ undergoes an elastic collision via central force with a particle of mass m_2 that is initially at rest. Given the scattering angles θ_1, $\theta_2 = \pi - \theta_1$ in the center-of-mass frame, find the sum $\bar{\theta}_1 + \bar{\theta}_2$ of the scattering angles in the laboratory frame as a function of θ_1 and m_1/m_2. Show that if $m_1 = m_2$ then we have $\bar{\theta}_1 + \bar{\theta}_2 = \pi/2$ for $0 < \theta_1 < \pi$.

Solution: