Consider an elastic collision between a particle of mass $m_1$ with a particle of mass $m_2$ initially at rest. If $m_1 > m_2$ show that the maximum angle $\theta_m$ through which $m_1$ can be deflected by the collision is given by

$$\theta_m = \cos^{-1} \sqrt{1 - \left(\frac{m_2}{m_1}\right)^2}$$

Note that in this case $\theta_m$ cannot exceed $90^0$. 