

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Department of Physics

Physics 105A

Winter 2012

Prof. Gary Horowitz

TA William Kelly

ASSIGNMENT #5

Due by Friday, February 10 at 5pm in box on first floor of Broida

1) Taylor, problem 4.35.

2) Taylor, problem 4.36

3) Taylor, problem 4.53

4.) Consider an elastic collision between an incoming particle with mass m_1 and a particle at rest with mass m_2 . Show that the angle θ between the two outgoing particles is less than $\pi/2$ if $m_1 > m_2$, but greater than $\pi/2$ if $m_1 < m_2$. Hint: Work in the lab frame and derive a formula for $\vec{v}_1 \cdot \vec{v}_2$ where \vec{v}_i is the final velocity of the i^{th} particle.

5) A weakly damped harmonic oscillator ($\beta \ll \omega_0$) of mass m is stretched a distance $x = A_0$ at $t = 0$ and then released. Find its energy as a function of time. Only keep terms to first order in β/ω_0 .