203a Homework 2, due Jan 30

1. Jackson 11.19.

2. A particle of mass M is at rest and then it decays into three particles with masses ordered as $m_1 > m_2 > m_3$. Which particle can emerge with the largest total energy, and what is that energy?

3. A particle of mass m_1 and energy E_1 collides with a particle of mass m_2 that was at rest. They stick together, forming a single particle of mass M. Find M, given E_1, m_1, and m_2.

4. Compton effect: a photon of frequency ω scatters off an electron at rest. Show that the outgoing photon has ω' with

$$\frac{1}{\hbar\omega'} - \frac{1}{\hbar\omega} = \frac{2}{mc^2}\sin^2\frac{\theta}{2},$$

where θ is the scattering angle between the incident and scattered photons.