

# PHYS 485: Problem Set 1

Due: 4:30 pm, 12 January 2010

Marks will be lost for not using four-vectors when you could have. If the answer is shown, all the marks will be given for the derivation not for writing down the answer.

1. [6] Griffiths Problem 3.10.
2. [5] Griffiths Problem 3.15.
3. [6] Griffiths Problem 3.23.
4. [5] Griffiths Problem 3.25.
5. [3] A pion at rest decays into a muon and a neutrino  $\pi^- \rightarrow \mu^- + \bar{\nu}_\mu$ . On the average, how far will the muon travel in vacuum before disintegrating?
6. [5] A photon of wavelength  $\lambda$  collides elastically with a charged particle of mass  $m$ . If the photon scatters at an angle  $\theta$ , find its outgoing wavelength  $\lambda'$ .