CM Spring 95 B

An antiproton with Kinetic Energy =1.00 GeV collides with a stationary proton to form a final state which is a new particle, X^0. In the following please give numerical answers correct to at least two significant figures. Protons and antiprotons have rest-mass energy $m_p c^2 = 0.94$ GeV.

a) Calculate the rest-mass energy and velocity of the X^0 particle. You may express the velocity in units of c.

b) The X^0 subsequently decays into two photons. One of the photons is emitted along the direction in which the X^0 was moving. Find its energy and the energy and direction of the other photon.

c) Another similarly produced X^0 decays as shown below, with the photons emitted at equal angles, ß, to the direction in which the X^0 was moving. Find the energies of the photons and the angle ß.