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 \( m_pc^2 = 0.94 \) 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, \( \beta \), to the direction in which the \( X^0 \) was moving. Find the energies of the photons and the angle \( \beta \).