1. A pion has kinetic energy 300 $MeV$, what is its momentum?

2. The Large Hadron Collider (LHC) under construction at CERN will collide two beams of protons. In each beam each proton has an energy of 7 $TeV$, so the total CM energy is 14 $TeV$. What laboratory energy would be required to achieve the same CM energy if energetic protons collided with a fixed target of protons?

3. A particle of mass $m_1$, at rest, decays into two particles of masses $m_2$ and $m_3$. Each have equal and opposite momentum, $p$. Find an expression for this momentum, in terms of the masses. (It’s OK to set $c = 1$)