Physics 273 - Fall 2018
Homework #3
Due 10/1

1) As outlaws escape in their getaway car, which goes \((3/4)c\), the cop fires a bullet from the pursuit car, which only goes \((1/2)c\). The speed of the bullet (relative to the gun) is \((1/3)c\). Does the bullet reach its target?

2) K&K 13.7. Show that in the limit that \(v<<c\) that you recover the Classical solution.

3) K&K 13.8


5) K&K 13.11

6) Particle A decays into particles B and C. Find the energy of the outgoing particles in terms of the various masses (in particle A’s frame). Find their momenta (Hint: use the triangle function to simplify the expression: 
\[\lambda(x,y,z) = x^2 + y^2 + z^2 - 2xy - 2xz - 2yz.\]

7) A pion traveling at speed \(v\) decays into a muon and a neutrino. If the neutrino emerges at 90° to the original pion direction, at what angle does the muon come off? Assume the neutrino is massless. Answer: 
\[\tan \theta = (1 - m^2/M^2)/(2\beta\gamma^2),\] where \(m\) and \(M\) are the mass of the muon and pion, respectively.