1. Prove momentum conservation is invariant under Galilean transformation. (ie. Momentum conservation doesn't depend on the velocity of the observer).
2. Prove that the electromagnetic wave equation: $\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}-\frac{1}{c^2}\frac{\partial^2\varphi}{\partial t^2}=0$ is NOT invariant under Galilean transformation. (i.e., the equation does NOT have the same form for a moving observer moving at speed of, say, $\vec{v}=v\hat{x}$).
3. In the Michelson-Morley experiment, the arms of the interferometer were (effectively) 11m each, and the wavelength of the light was 5900A. The experiment showed an upper limit of interference fringe shift of 0.005 fringes. Based on Aether theory, what is the upper limit of the speed of the earth in relative to Aether?