General Relativity HW 4 Quiz   Name_____

Load this one into Canvas when you get done. I will let you know the deadline for turning it in.

1. (*10pts*) Consider a particle moving along a path parameterized by λ and described by $x^\mu(\lambda) = (\lambda, (\lambda-1)^2, 2, -\lambda)$. Also consider a function over space-time which is given by $f(t, x, y, z) = t^2 + xy - z^2$. Find the value of λ for which $\frac{df}{d\lambda} = 0$.

2. (*10pts*) Consider the energy-momentum tensor $T^{\mu\nu}$ of a perfect fluid with equation of state $p = \frac{1}{3}\rho$. Find an explicit expression for $T^{\mu\nu}$ in a frame boosted along the x-axis with a speed v with respect to the overall rest frame of the fluid. Express your answer in terms of ρ and v. Your answer may include γ-factors as well.