

General Relativity Final Exam

Due Wednesday May 12th at 10am

I am looking for brief comments on each of the following. By brief I mean a half a page at best. You can use math, words either or both. The point of this is to help you reflect on the overall ideas of what you have been exposed to, not the details.

1. Tell me about special relativity. What does it mean to you now?
2. Tell me about tensors. What are they and how are they useful?
3. Tell me about relativistic kinematics and dynamics, in particular the emergence of energy-momentum as an important ingredient of general relativity.
4. Tell me about manifolds. Why were they important to Einstein?
5. Tell me about how the normal derivative is broken under general coordinate transformations, and what we did to fix it.
6. Tell me about the symmetries of spacetime. You can say a lot here, but the most high level story is the shortest.
7. Tell me about general relativity, i.e. Einstein's equation(s) and the geodesic equation.
8. Tell me about the Schwarzschild solution. What does it describe? What went into its derivation.
9. Tell me about maximally extended geometries. What are they good for and what are they useless for?
10. Tell me about cosmology. What have we confidently done, and where are the shortcomings?