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Riemannian Geometry as the mathematics of General Relativity JOHN LAUBENSTEIN, Charitable Management Systems, Inc. — Riemannian Geometry, in its most basic sense, is the mathematics of describing globally curved manifolds using locally flat, or Euclidian, geometry. It is deemed to be ideal for General Relativity due to the Equivalence Principle, which in modern terms is most often defined by the statement that in any sufficiently small region of space-time, the laws of physics for inertial systems hold true. That is, the local region is flat and all the laws of physics, including those of Special Relativity are valid. As such, the task of defining the curved manifold of space-time is in developing the "rules" for how locally flat regions of space-time fit together in a patchwork that is globally curved. These "rules" are perfectly described using Riemannian Geometry as long as the local region is truly flat. This paper discusses the relationship between Riemannian Geometry and the physical phenomenon of gravitation to ask the question: Does Riemannian Geometry truly define the curved space-time of General Relativity, or is it a mathematical model that closely simulates a more complex physical system of gravitation?

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