Riemannian Geometry: Exercise Set 5

Exercise 1

1. Do Exercises 5.6 and 5.7 of Lee (not *Problems* 5.6 and 5.7).

Exercise 2

1. Compute the Christoffel symbols of the flat metric on the plane, in polar coordinates. Write the geodesic equation explicitly. Verify that straight lines through the origin are geodesics.

Exercise 3

1. Suppose M is a complete Riemannian manifold which is isotropic around every point. Show that M is homogeneous. (Hint: given x and y, consider the midpoint of a geodesic from x to y.)