

## Riemannian Geometry, Hints 4

**4.1** Consider the product atlas on the product manifold.

**4.2** Compute  $\left. \frac{df(\gamma(t))}{dt} \right|_{t=0}$  using the chain rule.

**4.3** (a) Identify  $T_p\mathbb{R}^3$  with  $\mathbb{R}^3$ , then use the result of Exercise 4.2.

**4.4** (b) You may use the embedding of  $S^3$  described in Exercise 3.3.