

These problems from do Carmo:

- 2-5 1a,b,d, 3

As well as:

1. Let S be a surface of revolution about the z axis. Prove that rotations about the z axis are an isometry of S . (*Hint:* You have already shown these maps are diffeomorphisms. It might be easiest to compute directly what rotations do to the lengths of tangent vectors).

2. Let S be the cylinder defined by $S = \{(x, y, z) : x^2 + y^2 = 1\}$. Let $\hat{S}$ be the punctured unit ball:

$$\hat{S} = \{(x, y, z) : x^2 + y^2 < 1, z = 0, (x, y, z) \neq (0, 0, 0)\}.$$

Find a conformal map taking S to $\hat{S}$. Feel free to ask for hints if need be!