240B HW 1 Winter 2013

Due: Friday, 01/18.

1. Let f be a smooth function defined on an open subset $U \subset \mathbb{R}^n$. Consider the hypersurface $M \subset \mathbb{R}^{n+1}$ defined by the graph of f. That is

$$M = \{(x_1, \cdots, x_n, f(x_1, \cdots, x_n)) \mid (x_1, \cdots, x_n) \in U\}.$$

Then (with some abuse of notations here)

$$x_i : (x_1, \cdots, x_n, f(x_1, \cdots, x_n)) \to x_i, \quad 1 \le i \le n$$

defines coordinate system on all of M. Compute the metric tensor g in this coordinate for the Riemannian metric induced from $\mathbb{R}^{n+1}$.

2. do Carmo, p45, 1.

3. do Carmo, p46, 2.

4. do Carmo, p46, 3.

5. do Carmo, p46, 4.