

Math 5378, Differential Geometry
Homework 7
Due in-class on **Wednesday, March 26**

Numbered exercises are from Do Carmo, *Differential Geometry of Curves and Surfaces*.

1. Section 3.3, number 2.
2. Section 3.3, number 3.
3. Section 3.3, number 4.
4. Section 3.4, number 2.
5. Section 3.4, number 4.
6. Section 3.4, number 5.
7. Suppose that you have a vector field $a(u, v)x_u + b(u, v)x_v$ in a coordinate chart on a surface S , and E, F, G are the coefficients of the first fundamental form. Express the square of the length of the vectors as a function of u and v , and use the partial derivatives to determine when the vector field has constant length.
8. Suppose you have a curve $\alpha(t)$ in a surface $S \subset \mathbb{R}^3$, with normal vector field N . Show that if $\alpha''(t)$ is always parallel to $N_{\alpha(t)}$, then the length of $\alpha'(t)$ is constant.