Math 5378, Differential Geometry
Homework 8
Due in-class on **Wednesday, April 2**

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

1. Section 3.3, number 5.
2. Section 3.3, number 11.
3. Section 3.3, number 20.
4. Section 3.4, number 7.
5. Section 3.4, number 10.
6. Section 3.4, number 13.
7. Find the coefficients e, f, g and the matrix dN in coordinates for the coordinate chart

$$\mathbf{x}(u, v) = (u^2 + v^2, u + v, u - v).$$

8. For the coordinate chart

$$\mathbf{x}(u, v) = ((a + r\cos u)\cos v, (a + r\cos u)\sin v, r\sin u)$$

on the torus, write down and simplify (as much as possible) the second-order differential equation that a curve must satisfy in order to be a principal curve.