Math 443 **Topics in Topology and Geometry** **Spring 2003**

Assignment #7 (CORRECTED): Due *Wednesday*, 5/28/03

I. Reading:

- do Carmo, Section 4-6 (pp. 283–294).

II. Practice problems:

1. do Carmo, Section 4-5 (pp. 282–283) #1, 4, 8

III. Required problems:

1. do Carmo, Section 4-5 (pp. 282–283) #6.
2. do Carmo, Section 4-5 (pp. 282–283) #7.
3. Let $X(u, v) = (\sin u \cos v, \sin u \sin v, \cos u)$ be the spherical coordinate parametrization for S^2, and let $R = X([0, \pi/4] \times [\pi/4, \pi/2])$. Verify the Gauss-Bonnet formula for R by computing each term separately.
4. Let $f, g \colon \mathbb{R} \to \mathbb{R}$ be smooth functions with $f(v) > 0$ for all v, and let S be the surface of revolution in $\mathbb{R}^3$ generated by the curve $(y, z) = (f(v), g(v))$. Suppose that $f'(a) = f'(b) = 0$ for some $a < b \in \mathbb{R}$, and let $R \subset S$ be the regular region obtained by restricting f and g to the closed interval $[a, b]$. Show that $\iint_R K \, d\sigma = 0$.