HOMEWORK 6 **DIFFERENTIAL TOPOLOGY** **MTG 5932-02**

due Friday, October 31, 2008

1. Let $M \subset R^k$ be a compact k-manifold with boundary. Define the Gauss map $f : \partial M \to S^{k-1}$ by $f(x) =$ the outward unit normal vector to ∂M at x. A *genus g handlebody* M_g is a g-holed doughnut shape in R^3. So, M_0 is just a 3-ball, M_1 is a solid torus, etc. Calculate the degree of the Gauss map for each M_g.

For the remainder of this assignment, do problems 2, 7, and 10 from Milnor. For 2, you may assume that every complex polynomial factors into linear factors over the complex numbers. (This an easy consequence of the Fundamental Theorem of Algebra, which we proved earlier.) Also, think about 11, but don't hand it in.

ENJOY YOUR SPRING BREAK!!