# Problem Set #4

due Monday, February 23, 2004

1. doCarmo, section 1.7, # 6, 13 (Hint: You might want to do problem 12(d) from section 1.5.)
2. Let $\alpha$ be a regular curve whose tangent indicatrix, $T$, is also regular. Compute the curvature and torsion of $T$, in terms of the curvature and torsion of $\alpha$.
3. Let $\beta$ be a regular closed curve of length $L$. Prove that if the curvature of $\beta$ is bounded above by $1/R$, then $L \geq 2\pi R$.
4. Let $c$ be a regular closed plane curve.
   (a) Prove that if $c$ is simple, then the tangent indicatrix of $c$ is the entire unit circle.
   (b) Give an example to demonstrate that part (a) is false without the assumption that $c$ is simple.