Math 442 **Differential Geometry** **Winter 2012**

Assignment #3: Due Friday, 1/27/12

Reading:

- Read Section 1.5.

Written Assignment:

A. Exercise 1.18 (p. 11). [Hint: use the determinant formula for curvature that I derived in class today, together with the linear-algebraic fact that $\det(AB) = (\det A)(\det B)$ for square matrices A and B.]

B. Exercise 1.19 (p. 11).

C. Exercise 1.20 (p. 11). [Here is a somewhat more precise rephrasing of the exercise: Let $\alpha\colon I \to \mathbb{R}^2$ be a unit-speed curve. Suppose there is a smooth function $\theta\colon I \to \mathbb{R}$ such that $\alpha'(s) = (\cos\theta(s), \sin\theta(s))$ for all $s \in I$. (Such a function is called an ***angle function for*** $\boldsymbol{\alpha}$, and represents the angle between $\alpha'(s)$ and the unit vector parallel to the x-axis.) Show that $\theta'(s) = \pm k(s)$ for all $s \in I$.]