Math 376, Spring 2018
Homework 8
Due: April 4, 2018 in your discussion section

Terminology: a vector field $F\colon \mathbf{R}^3 \to \mathbf{R}^3$ is **irrotational** if $\operatorname{curl} F = 0$ and is **solenoidal** if $\operatorname{div} F = 0$.

(1) (Apostol 12.17.1)

(2) Let $F, G\colon \mathbf{R}^3 \to \mathbf{R}^3$ be vector fields. Show that

$$\operatorname{div}(F \times G) = (\operatorname{curl} F) \cdot G - F \cdot (\operatorname{curl} G).$$

Conclude that the cross product of two irrotational vector fields is solenoidal.

(3) (Apostol 12.17.10)

(4) (Apostol 12.21.1)