Math 376, Spring 2018
Homework 5
Due: February 28, 2018 in your discussion section

(1) (Apostol 11.15.6)
(2) (Apostol 11.15.9, 11.15.14, 11.15.16)
(3) (Apostol 11.22.1)
(4) Let C be the curve parametrized by $\alpha(t) = (t\cos t, t\sin t)$ for $0 \leq t \leq 2\pi$. Find the area of the region bounded by C and the positive x-axis.
(5) Pick numbers $0 < r_1 < r_2$ and consider the annulus

$$R = \{(x, y) \mid r_1^2 \leq x^2 + y^2 \leq r_2^2\}.$$

Let f be a continuously differentiable vector field defined on some open set containing R. By chopping R in half, use Green's theorem to find a formula for

$$\iint_R \left(\frac{\partial f_2}{\partial x} - \frac{\partial f_1}{\partial y}\right)$$

in terms of line integrals.
(6) Evaluate $\iint_{\mathbf{R}^3} \frac{1}{(x^2+y^2+z^2+1)^2}$.