UH - Math 7350 - Dr. Heier - Spring 2012
HW 5
Due 05/07/12, at the beginning of the Final Exam (= May 7, 2pm).

Use regular sheets of paper, stapled together.
Don't forget to write your name on page 1.

1. (1 point) Problem 11-3 (page 286)

2. (1 point) Problem 12-2 (page 319)

3. (1 point) Problem 13-1 (page 346)

4. (1 point) Problem 13-3 (page 346)

5. (1 point) Problem 13-6 (page 347)

6. (1 point) Let ω be the $(n-1)$-form on $\mathbb{R}^n \backslash \{\vec{0}\}$ defined by

$$\omega = \|x\|^{-n} \sum_{i=1}^{n} (-1)^{i-1} x^i dx^1 \wedge \ldots \wedge \hat{dx^i} \wedge \ldots \wedge dx^n,$$

where the $\hat{}$ symbol means deletion of a term. Prove that ω is closed but not exact on $\mathbb{R}^n \backslash \{\vec{0}\}$.

7. (1 point) Exercise 14.1 (page 356)

8. (1 point) Problem 14-6 (page 383)

9. (1 point) Let $\omega = xdy - ydx$ be a 1-form on $\mathbb{R}^2$. Let $M = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 < 1\}$. Verify Stokes' Theorem in this case by separately computing $\int_M d\omega$ and $\int_{\partial M} \omega$ and noticing that they agree.

10. (1 point) Let Γ denote the ellipsoid in $\mathbb{R}^3$ defined by

$$x^2 + \frac{y^2}{4} + \frac{z^2}{9} = 1.$$

Let $\omega = zdx \wedge dy - ydz \wedge dx$. Compute $\int_\Gamma \omega$.