MAT 142
Problem Set #4

due in class on February 17, 2005

1. Apostol, section 6.17 # 16–18, 21, 28, 29
2. Apostol, section 6.22 # 3, 4, 6, 36, 37, 43
3. Prove that for any number, x, and any positive number, a, $\ln a^x = x \ln a$.
4. Prove that from any real number, r, $\frac{d}{dx} x^r = r x^{r-1}$.
5. Compute $\displaystyle\int \frac{1}{ax^2 + bx + c}\, dx$. Hint: You will need to break this problem up into cases depending on the number of roots of $ax^2 + bx + c = 0$.
6. Prove that $e = \lim_{x \to 0} (1 + x)^{1/x}$. Hint: Compute $\ln'(1)$ and interpret this derivative as a limit.

Although it is not part of the assignment, I would strongly recommend that everyone do as many of the following problems as time allows:

7 Apostol, section 6.17 # 21–34

8 Apostol, section 6.22 # 12–25, 29–46

Also, there are no partial fractions problems on this week's homework. I have postponed them until next week.