Homework Set 4
DUE: Thurs, Feb. 12, 2009. Late papers accepted until 1:00 Friday.

The Problem Collection is at http://www.math.upenn.edu/~kazdan/609S09/hw/hw-collection.html

1. Problem Collection p. 18 #7

2. Problem Collection p. 19 #2

3. Problem Collection p. 19 #3

4. Problem Collection p. 19 #5

5. Problem Collection p. 59 #46

6. (Ahlfors, P. 108 #3) Compute \[ \int_{|z|=2} \frac{dz}{z^2 - 1}. \] [Hint: partial fractions].

7. (Ahlfors, P. 108 #6) Assume that \( f(z) \) is analytic in a region \( \Omega \) and satisfies the inequality \( |f(z) - 1| < 1 \) there. Show that
\[ \int_{\gamma} \frac{f'(z)}{f(z)} \, dz = 0 \]
for every closed curve \( \gamma \) in \( \Omega \).

8. (Ahlfors, P. 108 #7) If \( p(z) \) is a polynomial and \( C \) denotes the circle \( |z - a| = R \), compute
\[ \int_{C} p(z) \, d\bar{z}. \] [Answer: \( -2\pi i R^2 p'(a) \).]