Math 410 **Dr. DeTurck**
Assignment 2 **Due Thursday, September 24, 2009**

Reading: Textbook pp 8–18.

Practice problems: (don't hand these in)

1. Textbook page 28, problem 13(a),(b)
2. Textbook page 28, problem 16(a),(d) (It is allowed to use the result of problem 17 to do these, if you wish.)
3. Consider the function $f(z) = (z+1)/(z-1)$. What are the images of the x and y (real and imaginary) axes under the map defined by this function? Where to they intersect? At what angle(s)?
4. Let $u(x,y)$ be a function that satisfies Laplace's equation, $\Delta u = 0$, and let
$$f = \frac{\partial u}{\partial x} + i\frac{\partial u}{\partial y}.$$
Show that f is holomorphic.
5. Find the holomorphic function of $z = x + iy$ whose real part is $x^3 - 3xy^2$

Problems to hand in:

1. Textbook page 28, problem 13(c)
2. Textbook page 28, problam 16(c),(e),(f) (It is allowed to use the result of problem 17 to do these, if you wish.)
3. Textbook page 29, problem 17
4. Textbook page 29, problem 19 (for (c), you may use the result of problem 14 without proof).
5. Find the holomorphic function of $z = x + iy$ whose real part is $e^x \sin y$.
6. Find (all) the values of 2^i, $\sin(\frac{\pi}{4} + i)$.
7. Solve the equation $\sin z = 2$.
8. Let a be any positive number. Show that $f(z) = \tan z$ is bounded in the half-plane $\Im(z) > a$ (here, $\Im(z)$ means the imaginary part of z).