Math 121A Spring 2015, Homework 8

Due March 18 at 10am

All questions are from Boas Chapter 14. The starred ones require material which will be discussed in class on Friday, March 13.

1. Show that the function Log(z), the principal branch of the logarithm (i.e., always taking arg(z) $\in$ $[0, 2\pi)$) satsifies the polar form of the Cauchy-Riemann equations, derived in the previous homework. Hence verify that it is analytic everywhere except the nonnegative real axis.

2. Section 6: 5, 6, 26, 26', 32, 32'.

3. Find all the singularities of the function $f(z) = 1/\sin(z)$, as well as the residues at those singularities. Compute the values of the following integrals:

$$\oint_{|z|=1} f(z)dz \qquad \oint_{|z|=5} f(z)dz \qquad \oint_{|z-4|=2} f(z)dz,$$

where all contours are oriented positively.

4. Section 7: 2, 7, 11, 13, 17*, 20*, 22*, 24*, 29*.