

# Homework assignment #11

Math 317

Due Friday, April 29

1. read sections 64. If you want a bonus (20pts), find an alternative proof of the main result of section 64 using the map  $1/z$  to translate  $\int_C f(z)dz$  to  $\int_{\tilde{C}} z^{-2}f(z^{-1})dz$ ,  $\tilde{C}$  being the image of  $C$  by this map. If you want to make your life simple, [but get only 15 bonus pts] prove this only for  $C$  a circle around 0.
2. solve p. 230 ex. 5.
3. read section 80 (proof of Rouché's theorem). Note that what we have denoted in class as a winding number of  $f(C)$  is denoted by the textbook as  $\Delta_C \arg f(z)$  (and  $\Delta$  here has nothing to do with the Laplacian).
4. solve p. 285 ex. 1, 2, 5, 6, 9, 11, 12.
5. solve p. 358 ex. 1 [alternative directions to the one given in the textbook: write  $F = u_x - iu_y$ , and express this analytic function as a function of  $z$ . Now find the antiderivative of  $F$ .], 2, 8.