Complex Analysis

Math 312 Spring 1998 MWF 10:30am - 11:25am
Buckmire Fowler 112

Homework Set 5

ASSIGNED: Fri March 27 1998 **DUE: Fri April 03 1998**

1. (*8 points*) On page 120 in the text *Brown & Churchill* do: **1, 2, 5, 8**

2. (*8 points*) On page 128 in the text *Brown & Churchill* do: **1, 2, 5, 9**
   Most of the answers to the problems in the text are given. Therefore you must be more diligent than usual in explaining your solutions in order to get full credit.

3. (*5 points*) Determine the domain of analyticity for each of the given functions f and (write the domain using complex set notation). Explain why $\oint_{|z|=2} f(z)\,dz = 0$ for each of the following
   (a) $f(z) = \dfrac{z}{z^2+25}$ **(b)** $f(z) = e^{-z}(2z+1)$ **(c)** $f(z) = \text{Log}\,(z+3)$
   (d) $f(z) = \sec\left(\dfrac{z}{2}\right)$ **(e)** $f(z) = \dfrac{\cos(z)}{z^2-6z+10}$

4. (*5 points*) Let C be the ellipse $x^2/4 + y^2/9 = 1$ traversed once in the positive direction, and define
   $$G(z) := \oint_C \frac{\xi^2 - \xi + 2}{\xi - z} d\xi \qquad z \text{ inside } C$$
   Compute $G(1)$, $G'(i)$ and $G''(-1)$

5. (*4 points*) Compute $\oint_C \dfrac{\cos z}{z^2(z-3)} dz$ along the contour indicated in the figure below:

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(*5 points*) Use a separate sheet of paper to discuss your understanding of contour integrals. When you see a contour integral how do you evaluate it? What is the process you go through? Choose a specific example of a contour integral from this homework set and describe your solution process, detailing your thoughts, from the initial viewing of the problem to the final write-up of your answer. I suggest selecting problem # 5 as your specific example.

NOTES

This homework sets is due in class on **Friday April 03**. You are **strongly** encouraged to work collaboratively on the homework, though each person must hand in indvidually-written work. You should indicate on your neatly-written solution manuscripts which students you collaborated with. If you encounter difficulty, you should ask questions on the Complex Analysis wwwboard, the Complex Analysis email list, or come see me in my office (during Office Hours Wed 1-5 and Thu 3-5 or schedule an appointment).