Complex Analysis

Math 312 — MWF 10:30-11:25am

Spring 1996 — 201 Fowler

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Homework Set 5

ASSIGNED: Wed Apr 10 — **DUE: Fri Apr 19**

1. On page 100 in the text *Churchill & Brown* do: **3, 4, 6, 14**
2. On page 116 in the text *Churchill & Brown* do: **2, 3, 5, 8**
3. On page 124 in the text *Churchill & Brown* do: **1, 3**
4. On page 180 in the text *Churchill & Brown* do: **1, 5**
5. Determine the domain of analyticity for each of the given functions f and explain why $\int_{|z|=2} f(z)\,dz = 0$ for 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) $f(z) = \dfrac{\cos(z)}{z^2-6z+10}$

6. Let C be the ellipse $x^2/4 + y^2/9 = 1$ traversed once in the positive direction, and define
   $$G(z: = \int_C \frac{\xi^2-\xi+2}{\xi-z}d\xi \qquad z \text{ inside } C$$
   Compute $G(1)$, $G'(i)$ and $G''(-1)$
7. Evaluate $\int_{|z|=1} e^{1/z}\sin(1/z)\,dz$
8. Compute $\displaystyle\int \frac{\cos z}{z^2(z-3)}dz$ along the contour indicated in the figure below:

[NOTE: On the problems in the text, most of the answers are given. You must **show all work** to get full credit for these problems.]