Complex Analysis

Math 312 — MWF 10:30-11:25am

Spring 1996 — 201 Fowler

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Homework Set 3

ASSIGNED: Mon Feb 26 **DUE: Wed Mar 6**

1. On page 60 in the text *Churchill & Brown* do: **1(c), 2, 4(b), 8, 10**
2. Find all values of z such that
   (a) $e^z = -2$
   (b) $e^z = 1 + \sqrt{3}i$
   (c) $\exp(2z - 1) = 1$
   (d) $e^{4z} = 1$
   (e) $\cos z = i \sin z$
   (f) $e^{iz} = 3$
   (g) $\cos z = 2$
3. Write the following numbers in the form $a + bi$
   (a) $\exp\left(2 + \frac{i\pi}{4}\right)$
   (b) $\frac{\exp(1 + i3\pi)}{\exp(-1 + i\pi/2)}$
   (c) $\sin(2i)$
   (d) $\cos(1 - i)$
   (e) $\sinh(1 + \pi i)$
   (f) $\cosh\left(\frac{i\pi}{2}\right)$
4. Show that $e^{iz} = \cos z + i \sin z$ is true for all *complex* numbers z
5. Find dw/dz for each of the following:
   (a) $w = \exp(\pi z^2)$
   (b) $w = \cos(2z) + i \sin(\frac{1}{z})$
   (c) $w = \exp[\sin(2z)]$
   (d) $w = \tan^3 z$
6. Explain why the function $f(z) = \sin(z^2) + e^{-z} + iz + 2$ is entire
7. Explain why the function $\mathrm{Re}\left(\frac{\cos z}{e^z}\right)$ is harmonic in the whole plane.