HOMEWORK 2, DUE FRIDAY, JANUARY 27

Please turn in solutions for the following problems:

(1) Sketch each set and determine if each set is open, closed, connected, or bounded:

(a) $\mathrm{Re}(z) > \mathrm{Im}(z)$

(b) $1 < |z| < 2$

(c) $|2z - 4 + 6i| \leq 4$

(d) $0 \leq \arg(z) \leq \pi/4$

(e) $(\mathrm{Re}(z))^2 + 1 = (\mathrm{Im}(z))^2$

(2) For each of the following functions, determine the largest possible domain of definition.

(a) $f(z) = \dfrac{1}{z^2 + 1}$

(b) $f(z) = \dfrac{z}{z - \overline{z}}$

(c) $f(z) = \dfrac{1}{1 - |z|^2}$

(d) $f(z) = \mathrm{Arg}\left(\dfrac{1}{z}\right)$

(3) Consider the function $f(z) = (1 + i)\overline{z}$, and let S be the horizontal line $\mathrm{Im}(z) = 1$. Sketch the image set $f(S)$.

(4) Consider the function $f(z) = \mathrm{Arg}(z)$, and let S be the horizontal line $\mathrm{Im}(z) = 1$. Sketch the image set $f(S)$.

In addition, I suggest that you work these problems from the Brown/Churchill textbook (but do not turn in):

- Page 33, problems 1, 2, 3
- Page 44, problems 3, 4, 7
- Page 92, problems 1, 8
- Page 97, problems 1, 2, 7