Turn in starred problems Tuesday 1/31/2017.

Greenberg, Section 21.5: 5 (a), (b)\*, 10 (a), (e)\*, 12\*, 14 (a)\*, 15 (b)\*, (c), (d)\*. **See instruction 1 below for 5(b) and 10(e).**

**Instructions, comments and hints:**

1. Do problems 5(b) and 10(e) together. In fact, show that if you calculate the derivative of $1/z$ (i) by the rule for powers (or equivalently the quotient rule), (ii) directly as a limit, from (8), as in Example 2, or (iii) by any of the formulas (19), the answer is the same.

2. Hint for 14(a): use the Cauchy-Riemann equations and the following

**Fact:** If the real valued function $u(x, y)$ is defined and has partial deriviatives $u_x$ and $u_y$ which satisfy $u_x = u_y = 0$ throughout a connected open set $D$, then $u$ is constant in $D$.

3. For 15 (d), work in polar coordinates. In these coordinates you can use equation (1) of section 20.3 to determine if a given function is harmonic, and the appropriate Cauchy-Riemann equations (equations (30) of Section 21.5) to construct the conjugate harmonic function of a given harmonic function.