P661 Homework # 4 09/16/04

Due Tuesday 9/28/04

Finish reading Chapter 2.

Part 1

(1) Problem 2.1

Show this result by starting with the standard 2-dimensional Poisson equation. Find the Coulomb potential. Verify Coulomb's law.

Now write the Poisson equation in the $z - \bar{z}$ co-ordinate. Verify the equation in Problem 2.1.

(2) Derive Eq.(2.2.13).

Part 2:

(3) Starting from Eq.(2.4.25) and Eq.(2.6.5), show that L_n $(n = 0, \pm 1, \pm 2, ...)$ obey the Virasoro algebra (2.6.19). Here, do not assume Eq.(2.4.4), which is a particular realization of the Virasoro algebra that you have worked out before.

(4) Problem 2.7 (a).

(5) Problem 2.9.