Math 8702 – Spring 2014 – Problem Set 2

In addition to the assigned exercises in Ahlfors, complete the following exercises:

1. Temperature in the first quadrant of the plane is determined by setting the temperature T of the x-axis to be 0, and $T = c$ for some non-zero constant c along the y-axis. Find the temperature distribution in the first quadrant. (That is, solve the Dirichlet problem for a harmonic function with these boundary conditions.)

2. Give an algorithm for solving the Dirichlet problem on a rectangle, where the boundary condition on each side of the rectangle is a distinct constant. Can you use your algorithm to approximate the value of the solution at $(1/2, 1/2)$ on the unit square with arbitrary constants $c_1, \ldots, c_4$ assigned to the sides?