APM 346 (2012) Home Assignment Y

The purpose of this assignment is a survey of material in preparation to Term Test 2. Don't submit it–it will not be graded!
Main preparation to TT2 includes looking at TT2 for the last year and solving home assignments but there are two problem

Problem 1.
Consider Laplace equation in the half-strip

$$u_{xx} + u_{yy} = 0 \qquad x > 0,\ -\infty < y < \infty$$

with the boundary conditions

$$u(0, y) = e^{-|y|}$$

and condition $\max |u| < \infty$.
Solve using Fourier Transform; write the solution in the form of a Fourier integral.

Problem 2. Consider Laplace equation in the half-strip

$$u_{xx} + u_{yy} = 0 \qquad x > 0,\ -1 < y < 1$$

with the boundary conditions

$$u(x, -1) = u(x, 1) = 0,$$
$$u(0, y) = 1 - |y|$$

and condition $\max |u| < \infty$.

(a) Write the associated eigenvalue problem.

(b) Find all eigenvalues and corresponding eigenfunctions.

(c) Write the solution in the form of a series expansion.