(1) McOwen 4.4.1.

(2) McOwen 4.4.3.

(3) McOwen 4.4.5.

(4) McOwen 4.4.6 parts (a) and (b). Also, for \( a = 1 \) sketch a couple of the eigenfunctions (perhaps using the Mathematica command `ParametricPlot3D`).

Aside. For a nice introduction to Bessel functions, including information on how to evaluate integrals involving them, see G. F. Simmons *Differential equations, with applications and historical notes, 2nd ed.*

(5) McOwen 4.4.7. Find a proof using Green’s formulas, and a different proof using the maximum principle.