Running Wave vs. Standing Wave Solutions to the Particle-in-a-Box Schrodinger Problem

It is important to understand the difference between running wave solutions and standing wave solutions to the particle-in-a-box Schrodinger problem. They both get the job done, but differ in detail.

In the running wave solution you include left- and right-going solutions by including positive and negative k values. See lecture 25 and related links, and problem 5.39 of Griffiths.

In the standing wave solutions you consider the superposition of those running wave solutions and just include positive integers for the quantum numbers that arise from making the standing waves go to zero at each end of the box. See section 5.3.1 of Griffiths.

See problem 2.17 of Griffiths for the comparison of the two approaches.