

**Problem statement** Example 1 in section 3.11 of the text analyzes the following problem:

A 16-ft ladder leans against a wall. The bottom of the ladder is 5 ft from the wall at time  $t = 0$  and slides away from the wall at a rate of 3 ft/s. Find the velocity of the top of the ladder at time  $t = 1$ .

- a) The textbook response to this question is  $-\sqrt{3} \approx -1.732$  ft/s. The minus sign means the top of the ladder is sliding *down*. Check that the textbook's answer is correct.
- b) The speed of sound at sea level using the standard atmosphere is about 340.29 meters per second. There are 3.280840 feet in one meter. Using the assumptions of this model, find the angle between the ladder and the ground at the time that the top of the ladder breaks the speed of sound.
- c) The speed of light is about 299,792,458 meters per second. There are still 3.280840 feet in one meter. Using the assumptions of this model, find the angle between the ladder and the ground at the time that the top of the ladder moves at the speed of light.