Practice – 1

Once you feel confident with Related Rates: Trigonometric Functions, complete problems 1 to 4. Check your answers by going to the Solutions tab in Moodle.

Instructions: Answer each of the following practice questions on a separate piece of paper. Step by step solutions are provided under the Solutions tab. You will learn the material more thoroughly if you complete the questions before checking the answers.

1. The beam of a lighthouse sweeps across the path of a boat cruising parallel to the shoreline at a speed of $30\ \text{km/h}$. If the boat is $2\ \text{km}$ from the shore and stays within the beam of the light, at what rate is the beam revolving, in rad/h, when the boat has sailed $4\ \text{km}$ from a point opposite the lighthouse?

2. A ladder $8\ \text{m}$ long is resting against the vertical wall of a house. If the top of the ladder is sliding down the wall and the angle the ladder makes with the ground is decreasing at a rate of $\frac{1}{4}\ \text{rad/s}$, how fast is the ladder sliding down the wall when the angle between the ladder and the ground is $\frac{\pi}{4}$?

3. Two sides of a triangle measure $10\ \text{m}$ and $4\ \text{m}$. The angle between the two sides is increasing at a rate of $\frac{3}{50}\ \text{rad/s}$. Determine the rate at which the length of the third side is increasing when the angle between the $10\ \text{m}$ and $4\ \text{m}$ sides is $\frac{\pi}{3}$.