1) While sailing a boat offshore, Donna sees a lighthouse and calculates that the angle of elevation to the top of the lighthouse is 3°. When she sails her boat 700 feet closer to the lighthouse, she finds that the angle of elevation is now 5°. How tall, to the nearest tenth of a foot, is the lighthouse?

\[
\sin 175° \quad \sin 2° = \frac{x}{700} \\
x = 700 \left( \frac{\sin 175°}{\sin 2°} \right) \\
x \approx 1748.13 \text{ ft.}
\]

\[
\sin 90° \quad \sin 3° = \frac{y}{1748.13} \\
y = 1748.13 \left( \frac{\sin 3°}{\sin 90°} \right) \\
y \approx 9.1 \text{ ft.}
\]

**2) A ship at sea heads directly toward a cliff on the shoreline. The accompanying diagram shows the top of the cliff, D, sighted from two locations, A and B, separated by distance S. If \( m\angle DAC = 30 \), \( m\angle DBC = 45 \), and \( S = 30 \) feet, what is the height of the cliff, to the nearest foot?**

\[
\sin 135° \quad \sin 15° = \frac{x}{30} \\
x = 30 \left( \frac{\sin 135°}{\sin 15°} \right) \\
x \approx 81.96 \text{ ft.}
\]

\[
\sin 30° = \frac{\sin 90°}{h} \\
h = \frac{81.96 \left( \sin 30° \right)}{\sin 90°} \\
h \approx 41 \text{ ft.}
\]
3) Carmen and Jamal are standing 5,280 feet apart on a straight, horizontal road. They observe a hot-air balloon between them directly above the road. The angle of elevation from Carmen is 60° and from Jamal is 75°. Find the height of the balloon to the nearest foot.

4) As Mr. Fox strolls (yes, I do stroll sometimes…) down 34th Street, he glances up at the Empire State Building, and estimates the angle of elevation of his view to be 53.6°. After walking closer to the building, he makes another estimation of 64.7°. Knowing that the Empire State Building is 1250 feet tall, how far, to the nearest foot, was he from the building at each of the two locations where he took his estimates?
A ship captain at sea uses a sextant to sight an angle of elevation of 37° to the top of a lighthouse. After the ship travels 250 feet directly toward the lighthouse, another sighting is made, and the new angle of elevation is 50°. The ship’s charts show that there are dangerous rocks 100 feet from the base of the lighthouse. Find, to the nearest foot, how close to the rocks the ship is at the time of the second sighting.