3.2.1. Find \( \sin(\theta) \) and \( \cos(\theta) \) in the triangle below. Leave your answer in exact form.

\[ \sin(\theta) = \frac{5}{\sqrt{34}} \text{ and } \cos(\theta) = \frac{3}{\sqrt{34}} \]

3.2.2. Find \( \sin(\theta) \) and \( \cos(\theta) \) in the triangle below. Leave your answer in exact form.

\[ \sin(\theta) = \frac{5}{\sqrt{29}} \text{ and } \cos(\theta) = \frac{2}{\sqrt{29}} \]

3.2.3. Find the length of the hypotenuse of the right triangle shown below. Round your answer to two decimal places.

\[ \ell \approx 6.66 \]

3.2.4. Find \( a \) and \( b \) below. Round to two decimal places.

\[ a \approx 15.45 \text{ and } b \approx 14.93 \]

3.2.5. Suppose that \( \cos(\theta) = \frac{3}{19} \). What are the two possible values of \( \sin(\theta) \)? Round your answers to two decimal places.

\[ \sin(\theta) = \pm 0.95 \]

3.2.6. Suppose that \( \sin(\theta) = -\frac{4}{13} \). What are the two possible values of \( \cos(\theta) \)? Round your answers to two decimal places.

\[ \cos(\theta) = \pm 0.95 \]

3.2.7. Suppose that \( \sin(\theta) = -\frac{2}{3} \) and \( \cos(\theta) > 0 \). Find \( \cos(\theta) \). Round your answer to two decimal places.

\[ \text{Answer: } \sin(\theta) = 0.8 \]

3.2.8. Suppose that \( \cos(\theta) = -2/3 \) and \( 180^\circ \leq \theta \leq 360^\circ \). Find \( \sin(\theta) \). Round your answer to two decimal places.

\[ \text{Answer: } \sin(\theta) = -0.75 \]

3.2.9. Suppose that \( \sin(\theta) = 0.36 \) and \( \theta \leq 90^\circ \). Find \( \cos(\theta) \). Round your answer to two decimal places.

\[ \text{Answer: } \cos(\theta) = 0.93 \]

3.2.10. Find \( \ell \) below. Round to two decimal places.

\[ \text{Answer: } \ell \approx 6.66 \]

3.2.11. A ladder is 20 ft long and is leaning against the side of a house. The ladder is making an angle of 80° with the ground. How far is the base of the ladder from the wall? Round your answer to two decimal places.

\[ \text{Answer: } 3.47 \text{ ft} \]

3.2.12. When an airplane is taking off, it leaves the runway at an angle of 6°. That is, after its wheels leave the ground it is flying in a straight line that makes an angle of 6° with the ground. For safety purposes, the FAA requires that, after takeoff, the plane must be flying over the runway until it is at least 100 ft in the air. If a pilot wishes to follow this requirement on takeoff, what is the closest he or she can be to the end of the runway when his or her wheels leave the ground? Round your answer to two decimal places. \text{Note: The FAA has no such requirement to my knowledge; I made it up for the sake of the problem.}

\[ \text{Answer: } 951.44 \text{ ft} \]

3.2.13. Emilio likes to fly kites. His favorite kite has exactly 200 ft of string and on a particularly windy day he can attach the loose end of the string to the ground and watch the kite fly on its own. On one such day I used a protractor to measure the angle that the kite string made with the ground at 41°. How far off the ground was the kite at that particular time? Round your answer to two decimal places.

\[ \text{Answer: } 131.21 \text{ ft} \]
3.2.14. A ladder is 4 m long and is leaning against a house. If it makes a $75^\circ$ angle with the ground, how far is the base of the ladder from the house? Round to two decimal places.

Answer: 1.04 m

3.2.15. A rope is used to anchor a sign post to the ground and it is attached to the post halfway between the ground and the top of the post. Given that 7 ft of rope is needed and the rope makes an angle of $65^\circ$ with the ground, find the height of the sign post. Round your answer to two decimal places.

Answer: 12.69 ft

3.2.16. A strand of a spider web extends at an angle from the ground to a flag pole. If the strand is 15 ft long and makes an angle of $70^\circ$ with the ground, how high up on the flag pole does the web reach? Round your answer to two decimal places.

Answer: 14.10 ft

3.2.17. A ladder is leaning against a wall at an angle of $80^\circ$. If the base of the ladder is 3 ft from the wall, how high on the wall does the ladder reach? Round your answer to two decimal places.

Answer: 17.01 ft

3.2.18. Two roads diverged in a yellow wood at a right angle, both of which go in perfectly straight lines. Luckily, a straight dirt path has been built between the ends of these two roads for those who cannot make up their mind. The road less traveled is 3 mi long and meets the dirt path at a $42^\circ$ angle. How long is the dirt path? Round to two decimal places.

Answer: 4.04 mi

3.2.19. A hiking path goes straight from the base of a mountain to the top of the mountain. It is 4000 ft long and makes an angle of $27^\circ$ with the horizontal. How tall is the mountain?

Answer: 1815.96 ft