Section 7.1 Solving Right Triangles

Use Pythagorean Theorem and triangle definitions to find measure of missing sides in a right triangle.

\[a^2 + b^2 = c^2\]

\[
\sin A = \frac{a}{c} \\
\cos A = \frac{b}{c} \\
\tan A = \frac{a}{b}
\]

\[
\sin B = \frac{b}{c} \\
\cos B = \frac{a}{c} \\
\tan B = \frac{b}{a}
\]

**Example 1** Given right triangle ABC w/hypotenuse c, if \(a = 5\), \(b = 4\), find c.

**Example 2** A right triangle has an 8 inch hypotenuse. If one angle is 30°, find the length of each leg.

a) \(8\cos 30°, 8\sin 30°\)  
b) \(8/\cos 30°, 8/\sin 30°\)  
c) \(\cos 30°/8, \sin 30°/8\)  
d) \(8/\cos 60°, 8/\sin 60°\)
\[ \alpha = A \]

NOTE: \[ \beta = B \]

\[ \gamma = C \]

**Example 3** In the right triangle ABC, if hypotenuse \( c = 1 \) and \( b = x \), then \( (\cos \alpha)(\cot \beta) = \)

\[ a) \sqrt{1-x^2} \]
\[ b) \sqrt{1+x^2} \]
\[ c) \frac{x^2}{\sqrt{1-x^2}} \]
\[ d) \frac{1}{\sqrt{1-x^2}} \]

\[ e) \text{None of these} \]

**Example 4** A right triangle contains an angle of \( \pi/8 \) radians. If one leg is 3 meters, what is the length of the hypotenuse? (Hint: Two answers are possible.)

a) \( 3 \cos (\pi/8), 3 \sin (\pi/8) \)
b) \( 3/\cos (\pi/8), 3/\sin (\pi/8) \)
c) \( \cos (\pi/8)/3, \sin (\pi/8)/3 \)
d) \( 3 \cos (3\pi/8), 3 \sin (3\pi/8) \)