Extra Practice for Section I: Chapter 7

1. Find the value of all six trig functions for the angles α and β in the triangle in Figure 1. (The triangle may not be drawn to scale.)

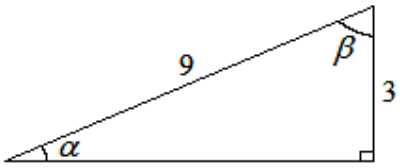

Figure 1

Click here to see the solution to **1.**

2. Find the values of c, A, and B in the triangle to the right. For practice, you should approximate the values on your calculator but, since the Midterm is a no-calculator exam, you won't be expected to approximate values on the Midterm.
(The triangle may not be drawn to scale.)

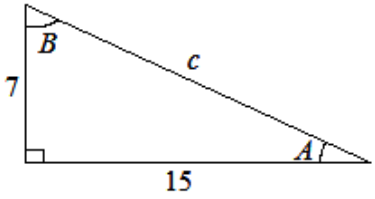

Figure 2

Click here to see the solution to **2.**

Solution to **1.**

1. Find the value of all six trig functions for the angles α and β in the triangle in Figure 1. (The triangle may not be drawn to scale.)

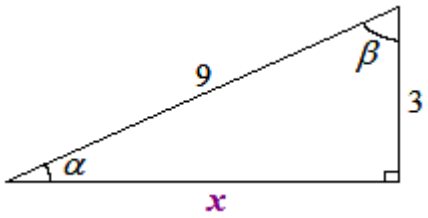

Figure 1

First let's use the Pythagorean Theorem to find the length of the side labeled x in Figure 1:

$$\begin{aligned} & x^2 + 3^2 = 9^2 \\ \Rightarrow\ & x^2 + 9 = 81 \\ \Rightarrow\ & x^2 = 72 \\ \Rightarrow\ & x = \sqrt{72} \\ \Rightarrow\ & x = 6\sqrt{2} \end{aligned}$$

Now, let's find the value of all six trig functions for the angle α:

$\sin(\alpha) = \frac{\text{OPP}}{\text{HYP}} = \frac{3}{9} = \frac{1}{3}$	$\cos(\alpha) = \frac{\text{ADJ}}{\text{HYP}} = \frac{6\sqrt{2}}{9} = \frac{2\sqrt{2}}{3}$	$\tan(\alpha) = \frac{\text{OPP}}{\text{ADJ}} = \frac{3}{6\sqrt{2}} = \frac{1}{2\sqrt{2}}$
$\csc(\alpha) = \frac{1}{\sin(\alpha)} = \frac{1}{\frac{1}{3}} = 3$	$\sec(\alpha) = \frac{1}{\cos(\alpha)} = \frac{1}{\frac{2\sqrt{2}}{3}} = \frac{3}{2\sqrt{2}}$	$\cot(\alpha) = \frac{1}{\tan(\alpha)} = \frac{1}{\frac{1}{2\sqrt{2}}} = 2\sqrt{2}$

Finally, let's find the value of all six trig functions for the angle β:

$\sin(\beta) = \frac{\text{OPP}}{\text{HYP}}$ $= \frac{6\sqrt{2}}{9}$ $= \frac{2\sqrt{2}}{3}$	$\cos(\beta) = \frac{\text{ADJ}}{\text{HYP}}$ $= \frac{3}{9}$ $= \frac{1}{3}$	$\tan(\beta) = \frac{\text{OPP}}{\text{ADJ}}$ $= \frac{6\sqrt{2}}{3}$ $= 2\sqrt{2}$
$\csc(\beta) = \frac{1}{\sin(\beta)}$ $= \frac{1}{\frac{2\sqrt{2}}{3}}$ $= \frac{3}{2\sqrt{2}}$	$\sec(\beta) = \frac{1}{\cos(\beta)}$ $= \frac{1}{\frac{1}{3}}$ $= 3$	$\cot(\beta) = \frac{1}{\tan(\beta)}$ $= \frac{1}{2\sqrt{2}}$

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Solution to **2.**

2. Find the values of c, A, and B in the triangle to the right. For practice, you should approximate the values on your calculator but, since the Midterm is a no-calculator exam, you won't be expected to approximate values on the Midterm.
(The triangle may not be drawn to scale.)

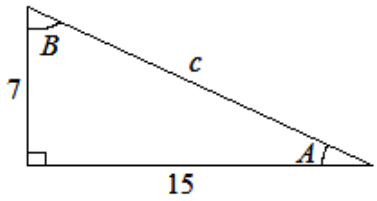

Figure 2

First let's use the Pythagorean Theorem to find the length of the side c in Figure 2:

$$\begin{aligned} c^2 &= 7^2 + 15^2 \\ \Rightarrow\ c^2 &= 49 + 225 \\ \Rightarrow\ c^2 &= 274 \\ \Rightarrow\ c &= \sqrt{274} \approx 16.55 \end{aligned}$$

Now we can use the tangent function to get an equation involving angle A and then solve the equation for A:

$$\begin{aligned} \tan(A) &= \frac{7}{15} \\ \Rightarrow\quad A &= \tan^{-1}\left(\frac{7}{15}\right) \approx 25.02^\circ \end{aligned}$$

Note that we've chosen to use tangent (instead of sine or cosine) to find A since that allows us to use the given side-lengths. If we use sine or cosine, we need to use the value of that we found above but it's possible that we made a mistake so, whenever possible, it's more sensible rely on the given information rather than on information that we've found ourselves.

Finally, we can use the rule that the sum of the angles in a triangle is always 180° to find angle B:

$$\begin{aligned} A + B + 90^\circ &= 180^\circ \\ \Rightarrow\ 25.02^\circ + B + 90^\circ &\approx 180^\circ \\ \Rightarrow\ B &\approx 180^\circ - 90^\circ - 25.02^\circ \\ \Rightarrow\ B &\approx 54.98^\circ \end{aligned}$$

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