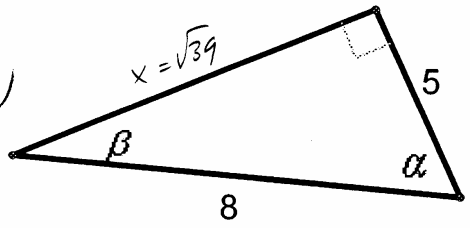
Math 61 Spring 2006 **QUIZ #5 @ 30 points** Name:

Write in a neat and organized fashion. Use a pencil. Show all work to get credit. SOLUTIONS

1. Find $\sin\alpha$, $\cos\beta$, $\tan\alpha$, $\cot\beta$ if



Let x = unknown leg

Then $x^2 = 8^2 - 5^2$ (Pythagorean theorem)

$x^2 = 39$

$x = \sqrt{39}$

$\sin\alpha = \frac{\sqrt{39}}{8}$ $\quad \tan\alpha = \frac{\sqrt{39}}{5}$

$\cos\beta = \frac{\sqrt{39}}{8}$ $\quad \cot\beta = \frac{\sqrt{39}}{5}$

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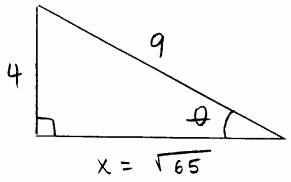
2. Sketch a right triangle that has one acute angle θ, and find the other five trigonometric ratios of θ knowing that $\sin\theta = \frac{4}{9}$



Let x = unknown leg

$x^2 = 9^2 - 4^2$ (Pythagorean theorem)

$x^2 = 65 \Rightarrow x = \sqrt{65}$

$\cos\theta = \frac{\sqrt{65}}{9}$ $\quad \sec\theta = \frac{1}{\cos\theta} = \frac{9}{\sqrt{65}} = \frac{9\sqrt{65}}{65}$

$\tan\theta = \frac{4}{\sqrt{65}} = \frac{4\sqrt{65}}{65}$ $\quad \csc\theta = \frac{1}{\sin\theta} = \frac{9}{4}$

$\cot\theta = \frac{\sqrt{65}}{4}$

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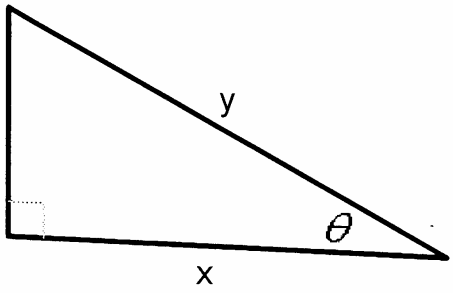
3. Express x and y in terms of trigonometric ratios of θ.



x: $\tan\theta = \frac{6}{x} \Rightarrow x = \frac{6}{\tan\theta}$ OR $x = 6\cot\theta$

OR

$\cot\theta = \frac{x}{6} \Rightarrow x = 6\cot\theta$

y: $\sin\theta = \frac{6}{y} \Rightarrow y = \frac{6}{\sin\theta}$ OR $y = 6\csc\theta$

4. Simplify the following expressions:

a) $\cos u + \tan u \sin u =$

$= \cos u + \frac{\sin u}{\cos u} \cdot \frac{\sin u}{1}$

$= \cos u + \frac{\sin^2 u}{\cos u}$

$= \frac{\cos^2 u + \sin^2 u}{\cos u} = \boxed{\frac{1}{\cos u} = \sec u}$

b) $\tan x \cos x \csc x =$

$= \frac{\sin x}{\cos x} \cdot \frac{\cos x}{1} \cdot \frac{1}{\sin x}$

$= 1$

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5. Verify the identity.

$\cos\theta(\sec\theta - \cos\theta) = \sin^2\theta$

$\cos\theta(\sec\theta - \cos\theta) = \cos\theta\left(\frac{1}{\cos\theta} - \cos\theta\right)$

$= 1 - \cos^2\theta$ (b/c $\sin^2\theta + \cos^2\theta = 1$, $\sin^2\theta = 1 - \cos^2\theta$)

$= \sin^2\theta$

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6. Show that the equation is not an identity.

$\sin x - \cos x = 0$

if $x = 30°$, then $\sin 30° - \cos 30° =$

$= \frac{1}{2} - \frac{\sqrt{3}}{2} \neq 0$

Therefore, $\sin x - \cos = 0$ is not an identity.

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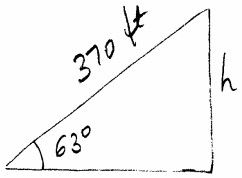
7. A man is lying on the beach, flying a kite. He holds the end of the kite string at ground level, and estimates the angle of elevation of the kite to be $63°$. If the string is 370 ft long, how high is the kite above the ground?



Let h = height

$\sin 63° = \frac{h}{370}$

$h = 370 \sin 63°$

$h \approx 330$ ft