Warm Up 2/11

1) Given $\cos\theta = -\frac{1}{4}$ and $\sin\theta < 0$ find $\tan\theta$

$\sec\theta = -4$

$\tan^2\theta + 1 = (-4)^2$

$\tan^2\theta = 15$
$\tan\theta = \pm\sqrt{15}$
$\tan\theta = \sqrt{15}$

$\sin^2\theta + \left(-\frac{1}{4}\right)^2 = 1$
$\sin^2\theta + \frac{1}{16} = 1$
$\sin^2\theta = \frac{15}{16}$
$\sin\theta = \pm\frac{\sqrt{15}}{4}$
$\sin\theta = -\frac{\sqrt{15}}{4}$

$\tan\theta = \dfrac{-\frac{\sqrt{15}}{4}}{-\frac{1}{4}} = \sqrt{15}$

2) Given $\cot\theta = 5$ and $\cos\theta < 0$ find $\sin\theta$

$(5)^2 + 1 = \csc^2\theta$
$26 = \csc^2\theta$
$\pm\sqrt{26} = \csc\theta$
$-\sqrt{26} = \csc\theta$
$-\frac{1}{\sqrt{26}} = \sin\theta$

$$\boxed{\sin\theta = -\frac{\sqrt{26}}{26}}$$

5.1 day 2   ex 3, 4 + 5

Goal : Be able to use cofunctions + odd/even properties to evaluate trig fcn's. Use basic trigonometric identities to simplify + rewrite trig equations

Co function Identities

$\sin\theta = \cos\left(\frac{\pi}{2}-\theta\right)$

$\cos\theta = \sin\left(\frac{\pi}{2}-\theta\right)$

$\tan\theta = \cot\left(\frac{\pi}{2}-\theta\right)$

$\cot\theta = \tan\left(\frac{\pi}{2}-\theta\right)$

$\csc\theta = \sec\left(\frac{\pi}{2}-\theta\right)$ $\left| \sec\theta = \csc\left(\frac{\pi}{2}-\theta\right)\right.$

odd/even properties

even f(x)
$f(-x) = f(x)$
cos x ; sec x

odd f(x)
$f(-x) = -f(x)$
sin x ; tan x
csc x ; cot x

ex] Given $\sin x = -0.572$ find

$\cos(x - \frac{\pi}{2})$

$$\cos(x - \frac{\pi}{2}) = \cos(-(\frac{\pi}{2} - x))$$
$$= \cos(\frac{\pi}{2} - x)$$
$$= \sin x$$
$$= -0.572$$

y+] Given $\tan \theta = 0.719$ find $\cot(\theta - \frac{\pi}{2})$

$$\cot(\theta - \frac{\pi}{2}) = \cot(-(\frac{\pi}{2} - \theta))$$
$$= -\cot(\frac{\pi}{2} - \theta)$$
$$= -\tan \theta$$
$$= -0.719$$

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tips: ① Rewrite everything in terms of sine and cosine

② Simplify by factoring out like terms

③ rewrite as a single fraction

④ multiply by the conjugate $\frac{(a+b)}{(a-b)}$

⑤ If you see a squared term or the #1 — go to your pythagorean identities

⑥ | try your best / try something |

☺

$ex)$ $\quad \sin x \cot x \rightarrow \cos x$

$$\sin x \left(\frac{\cos x}{\sin x} \right) \qquad \text{sine/cosine}$$

$$\cos x \rightarrow \cos x \ :) \quad \checkmark$$

$ex)$ $\quad \sec x \csc x - \cos x \csc x \rightarrow \tan x$

$$\left(\frac{1}{\cos x} \right) \left(\frac{1}{\sin x} \right) - \cos x \left(\frac{1}{\sin x} \right) \qquad \text{sine/cosine}$$

$$\frac{1}{\cos x \sin x} - \frac{\cos x}{\sin x} \left(\frac{\cos x}{\cos x} \right) \qquad \text{common denominator}$$

$$\frac{1}{\cos x \sin x} - \frac{\cos^2 x}{\sin x \cos x} \qquad \text{single fraction}$$

$$\frac{1 - \cos^2 x}{\cos x \sin x} \qquad \text{pythag. identity}$$

$$\frac{\sin^2 x + \cos^2 x - \cos^2 x}{\cos x \sin x}$$

$$\frac{\sin^2 x}{\cos x \sin x} \qquad \text{simplify}$$

$$\frac{\sin x}{\cos x}$$

$$\tan x \rightarrow \tan x \ :) \quad \checkmark$$

$ex)$ $\quad \cos x \left(1 + \tan^2 x \right) \rightarrow \sec x$

$$\cos x \left(\sec^2 x \right) \qquad \text{pythag}$$

$$\cos x \left(\frac{1}{\cos^2 x} \right) \qquad \text{recip}$$

$$\frac{1}{\cos x} \qquad \text{simplify}$$

$$\sec x \rightarrow \sec x$$

y+1 $\sec x (1 - \sin^2 x)$ $\rightarrow \cos x$

$$\sec x (\cos^2 x)$$

$$\cancel{\sec x} \left(\frac{1}{\sec^2 x} \right)$$

$$\frac{1}{\sec x}$$

$$\cos x \rightarrow \cos x \quad \checkmark$$