Section 6.1
Sum and Difference Formulas

$\sin(A+B)=\sin A\cos B+\cos A\sin B$

$\cos(A+B)=\cos A\cos B-\sin A\sin B$

$\sin(A-B)=\sin A\cos B-\cos A\sin B$

$\cos(A-B)=\cos A\cos B+\sin A\sin B$

$$\tan(A+B)=\frac{\tan A+\tan B}{1-\tan A\tan B}$$

$$\tan(A-B)=\frac{\tan A-\tan B}{1+\tan A\tan B}$$

Example 1: Use the appropriate angle-sum formula to simplify the following expression.

a. $\sin\left(15^o\right)\cos\left(75^o\right)+\cos\left(15^o\right)\sin\left(75^o\right)$

b. $\cos\left(\frac{\pi}{3}\right)\cos\left(\frac{\pi}{5}\right)-\sin\left(\frac{\pi}{3}\right)\sin\left(\frac{\pi}{5}\right)$

Example 2: If $\sin x=\alpha$ then $\sin\left(\pi-x\right)=\alpha$. True or False?

Example 3: $\tan\left(\frac{\pi}{2}-x\right)=\cot x$, True or False?

Be careful when verifying whether a statement involving tan or cot is true or false. This is because tan and cot come from sin/cos or cos/sin, respectively.

Start with the left-hand side…there's more to work with there.

$\tan\left(\frac{\pi}{2}-x\right)$

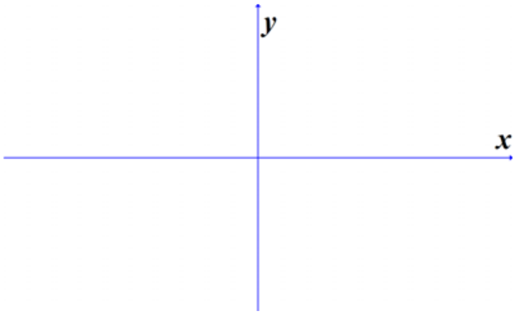
Example 4: Let $\tan\alpha = \frac{5}{2}$ with $\pi < \alpha < \frac{3\pi}{2}$ and $\cos\beta = \frac{1}{2}$, with $\frac{3\pi}{2} < \beta < 2\pi$. Find $\cos(\alpha+\beta)$ and $\tan(\alpha-\beta)$.

Recall: $\cos\left(\alpha+\beta\right) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\tan(\alpha-\beta)$.

Recall: $\tan(\alpha-\beta) = \dfrac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$

For alpha:



For beta: