

4.14b Quiz Review WS – Trig Sum/Difference and Double Angle Evaluation of Identities

Key

Use the sum & difference identities with unit circle values to find exact answers for the following:

1) $\tan -105^\circ$

$\tan(-45+60)$

$$\frac{\tan(-45) + \tan(-60)}{1 - \tan(-45)\tan(-60)}$$

$$\frac{-1 - \sqrt{3}}{1 - (-1)(-\sqrt{3})} = \boxed{\frac{-1 - \sqrt{3}}{1 - \sqrt{3}}}$$

2) $\cos 15^\circ \rightarrow \cos(60-45)$

$\cos 60 \cos 45 + \sin 60 \sin 45$

$$\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) \rightarrow \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$$

$$\rightarrow \boxed{\frac{\sqrt{2} + \sqrt{6}}{4}}$$

Given: $\csc \alpha = \frac{13}{5}$, $\frac{\pi}{2} \leq \alpha \leq \pi$, and $\tan \beta = -\frac{3}{4}$, $\frac{3\pi}{2} \leq \beta \leq 2\pi$, find the following:

Q2

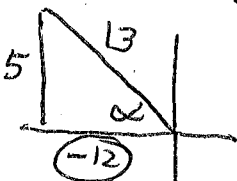
Q4

3) $\sin(\alpha - \beta)$

4) $\cos(\beta + \alpha)$

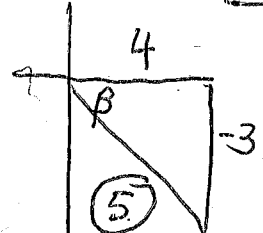
5) $\tan(\alpha - \beta)$

$\csc \alpha = \frac{13}{5}$ Q2



$a^2 + 5^2 = 13^2$
 $a = 12$

$\tan \beta = -\frac{3}{4}$ Q4



$(-3)^2 + 4^2 = c^2$
 $c = 5$

$\sin(\alpha - \beta)$

$\sin \alpha \cos \beta - \cos \alpha \sin \beta$

$$\left(\frac{5}{13}\right)\left(\frac{4}{5}\right) - \left(\frac{-12}{13}\right)\left(\frac{-3}{5}\right)$$

$$\frac{20}{65} - \frac{36}{65} = \boxed{\frac{-16}{65}}$$

4) $\cos(\beta + \alpha)$

$\cos \beta \cos \alpha - \sin \beta \sin \alpha$

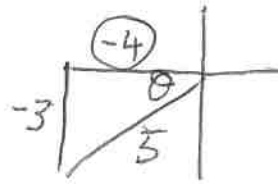
$$\left(\frac{4}{5}\right)\left(\frac{-12}{13}\right) - \left(\frac{-3}{5}\right)\left(\frac{5}{13}\right)$$

$$\frac{-48}{65} + \frac{15}{65} = \boxed{\frac{-33}{65}}$$

5) $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta} \rightarrow \frac{\frac{-5}{12} - \left(\frac{-3}{4}\right)}{1 + \left(\frac{-5}{12}\right)\left(\frac{-3}{4}\right)} = \boxed{\frac{16}{63}}$

If $\sin \theta = -\frac{3}{5}$ and $\cos \theta < 0$

Q3



6) $\cos(\theta + \frac{\pi}{3})$

$$\cos \theta \cos(\frac{\pi}{3}) - \sin \theta \sin(\frac{\pi}{3})$$

$$(\cos \theta)(\frac{1}{2}) - (\sin \theta)(\frac{\sqrt{3}}{2})$$

$$\frac{1}{2} \cos \theta - \frac{\sqrt{3}}{2} \sin \theta$$

$$\frac{1}{2}(-\frac{4}{5}) - \frac{\sqrt{3}}{2}(-\frac{3}{5}) = \boxed{\frac{-4+3\sqrt{3}}{10}}$$

Find the Following:

8) $\sin(\pi - x) =$

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

$$= \sin \pi \cos x - \cos \pi \sin x$$

$$= (0) \cos x - (-1) \sin x$$

$$= 0 + \sin x$$

$$= \boxed{\sin x}$$

9) $\cos(30^\circ - x) + \cos(30^\circ + x) =$

$$\cos 30^\circ \cos x + \sin 30^\circ \sin x + \cos 30^\circ \cos x - \sin 30^\circ \sin x$$

$$\frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \sin x + \frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \sin x$$

$$\frac{2\sqrt{3}}{2} \cos x \rightarrow \boxed{\sqrt{3} \cos x}$$

7) $\tan 2\theta \ast \tan 2\theta = \frac{2 \tan \theta}{1 - (\tan \theta)^2}$

$$2 \left(\frac{3}{4} \right)$$

$$1 - \left(\frac{3}{4} \right)^2$$

$$\frac{3}{2}$$

$$1 - \frac{9}{16}$$

$$\frac{3}{2}$$

$$\frac{16}{16} - \frac{9}{16}$$

$$\frac{\frac{3}{2}}{\frac{7}{16}}$$

$$\frac{3}{2} \cdot \frac{16}{7}$$

$$\boxed{\frac{24}{7}}$$