Monday, March 05, 2018
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Name: KEY Date: ____________ Period: __________

Precalculus: 5.4 Quiz Review

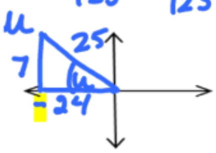
1. Given $\sin u = \frac{7}{25}$ & $\cos v = \frac{3}{5}$. Angle u is in Quad. II and Angle v is in Quad. IV. Find the <u>exact value</u> of each:

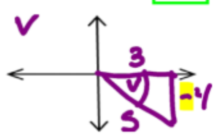
a. $\sin(u - v)$

$\sin u \cos v - \cos u \sin v$

$= \left(\frac{7}{25}\right)\left(\frac{3}{5}\right) - \left(\frac{-24}{25}\right)\left(\frac{-4}{5}\right)$

$= \frac{21}{125} - \frac{96}{125} = \frac{-75}{125} = \boxed{\frac{-3}{5}}$





b. $\cos(u - v)$

$\cos u \cos v + \sin u \sin v$

$= \left(\frac{-24}{25}\right)\left(\frac{3}{5}\right) + \left(\frac{7}{25}\right)\left(\frac{-4}{5}\right)$

$= \frac{-72}{125} + \frac{-28}{125}$

$= -\frac{100}{125} = \boxed{\frac{-4}{5}}$

c. $\tan(u - v)$

$\frac{\tan u - \tan v}{1 - \tan u \tan v} = \frac{\left(-\frac{7}{24}\right) - \left(-\frac{4}{3}\right) \cdot \frac{8}{8}}{1 + \left(-\frac{7}{24}\right)\left(-\frac{4}{3}\right)} = \frac{\frac{25}{24}}{\frac{25}{18}}$

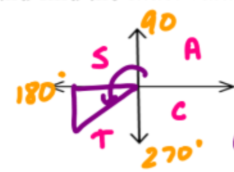
$= \frac{25}{24} \cdot \frac{18}{25} = \boxed{\frac{3}{4}}$

2. Write the expression as the sine, cosine or tangent of a single angle and find the *exact value*.

$\cos 261° \cos 36° + \sin 261° \sin 36°$

$\cos(261° - 36°) = \cos 225°$

$= \boxed{\frac{-\sqrt{2}}{2}}$



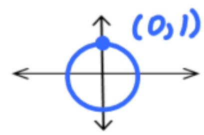
$\theta' = 45°$

3. Verify: $\cos\left(\frac{\pi}{2} - x\right) = \sin x$

$\cos\frac{\pi}{2} \cos x + \sin x \sin\frac{\pi}{2} = \sin x$

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

$\sin x = \sin x$ ✓



4. Solve over $[0, 2\pi)$: $\sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right) = 1$

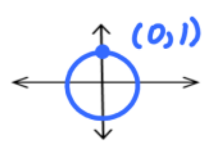
$\sin x \cos\frac{\pi}{3} + \cos x \sin\frac{\pi}{3} + \sin x \cos\frac{\pi}{3} - \cos x \sin\frac{\pi}{3} = 1$

$\sin x\left(\frac{1}{2}\right) + \cancel{\cos x\left(\frac{\sqrt{3}}{2}\right)} + \sin x\left(\frac{1}{2}\right) - \cancel{\cos x\left(\frac{\sqrt{3}}{2}\right)} = 1$

$\frac{1}{2}\sin x + \frac{1}{2}\sin x = 1$

$\sin x = 1$

$\boxed{x = \frac{\pi}{2}}$



5. Find the exact value of each using a sum or difference formula:

a. $\sin 255°$

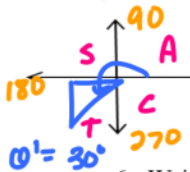
$\sin(45° + 210°) =$

$\sin 45° \cos 210° + \cos 45° \sin 210°$

$= \left(\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(-\frac{1}{2}\right)$

$= \frac{-\sqrt{6}}{4} + \frac{-\sqrt{2}}{4}$

$= \boxed{\frac{-\sqrt{6}-\sqrt{2}}{4}}$



b. $\cos 255°$

$\cos(45° + 210°) =$

$\cos 45° \cos 210° - \sin 45° \sin 210°$

$= \left(\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(-\frac{1}{2}\right)$

$= -\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$

$= \boxed{\frac{-\sqrt{6}+\sqrt{2}}{4}}$

c. $\tan 255° = \tan(45° + 210°)$

$\frac{\tan 45° + \tan 210°}{1 - \tan 45° \tan 210°} =$

$\frac{1 + \frac{\sqrt{3}}{3}}{1 - (1)\left(\frac{\sqrt{3}}{3}\right)} = \frac{1 + \frac{\sqrt{3}}{3} \cdot 3}{1 - \frac{\sqrt{3}}{3} \cdot 3}$

$= \frac{(3+\sqrt{3})}{(3-\sqrt{3})} \cdot \frac{(3+\sqrt{3})}{(3+\sqrt{3})} = \frac{9 + 6\sqrt{3} + 3}{9 - 3}$

$= \frac{12 + 6\sqrt{3}}{6}$

$= \boxed{2 + \sqrt{3}}$

6. Write the expression as the sine, cosine or tangent of a single angle and find the *exact value*.

a. $\sin 50° \cos 20° - \cos 50° \sin 20° =$

$\sin(50° - 20°) =$

$\sin 30° = \boxed{\frac{1}{2}}$

b. $\cos 40° \cos 20° - \sin 40° \sin 20° =$

$\cos(40° + 20°) =$

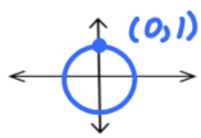
$\cos 60° = \boxed{\frac{1}{2}}$

7. Verify: $\sin\left(\frac{\pi}{2} + x\right) = \cos x$

$\sin\frac{\pi}{2} \cos x + \cos\frac{\pi}{2} \sin x = \cos x$

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

$\cos x = \cos x$ ✓



8. Solve over $[0, 2\pi)$: $\sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right) = \frac{1}{2}$

$\sin x \cos\frac{\pi}{3} + \cancel{\cos x \sin\frac{\pi}{3}} + \sin x \cos\frac{\pi}{3} - \cancel{\cos x \sin\frac{\pi}{3}} = \frac{1}{2}$

$2 \sin x \cos\frac{\pi}{3} = \frac{1}{2}$

$2 \sin x \left(\frac{1}{2}\right) = \frac{1}{2}$

$\sin x = \frac{1}{2}$

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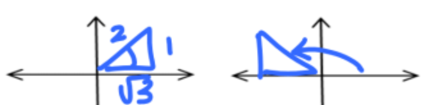

$x = \boxed{\frac{\pi}{6}}$ $x = \boxed{\frac{5\pi}{6}}$