

PreCalculus
WS: 5.4 Extra Practice

Name Key
Date 1/3/14/17 Block 2B, 1A

1. Find the exact value of $\cos \frac{\pi}{16} \cos \frac{3\pi}{16} - \sin \frac{\pi}{16} \sin \frac{3\pi}{16} - \cos(\text{sum})$

$$\cos\left(\frac{\pi}{16} + \frac{3\pi}{16}\right) = \cos \frac{4\pi}{16} = \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

2. Find the exact value of sine, cosine, and tangent of the angle by using the sum or difference formulas.

formulas. $\frac{17\pi}{12}$ Hint: $\frac{17\pi}{12} = \frac{9\pi}{4} - \frac{5\pi}{6} \rightarrow \frac{17\pi}{12} = \frac{5\pi}{3} - \frac{\pi}{4}$ ← Better

$$\sin\left(\frac{17\pi}{12}\right) = \sin\left(\frac{9\pi}{4} - \frac{5\pi}{6}\right) = \sin \frac{9\pi}{4} \cos \frac{5\pi}{6} - \cos \frac{9\pi}{4} \sin \frac{5\pi}{6}$$

$$= \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) = \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$\cos\left(\frac{17\pi}{12}\right) = \cos\left(\frac{9\pi}{4} - \frac{5\pi}{6}\right) = \cos \frac{9\pi}{4} \cos \frac{5\pi}{6} + \sin \frac{9\pi}{4} \sin \frac{5\pi}{6}$$

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

$$\tan\left(\frac{17\pi}{12}\right) = \tan\left(\frac{9\pi}{4} - \frac{5\pi}{6}\right) = \frac{\tan \frac{9\pi}{4} - \tan \frac{5\pi}{6}}{1 + \tan \frac{9\pi}{4} \tan \frac{5\pi}{6}} = \frac{3 - \frac{1}{\sqrt{3}}}{1 + 3 \cdot \frac{1}{\sqrt{3}}} = \frac{3(1 - \frac{\sqrt{3}}{3})}{3(1 + \frac{\sqrt{3}}{3})} = \frac{(3 - \sqrt{3})(3 + \sqrt{3})}{(3 + \sqrt{3})(3 + \sqrt{3})} = \frac{9 - 3}{9 + 6\sqrt{3} + 3} = \frac{6}{12 + 6\sqrt{3}} = \frac{1}{2 + \sqrt{3}}$$

Find the exact value of the trigonometric function given that $\sin u = -\frac{7}{25}$ and $\cos v = -\frac{4}{5}$. (Both are in Quadrant III.)

III.)



3. $\cos(u+v)$

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

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

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

4. $\tan(u-v)$

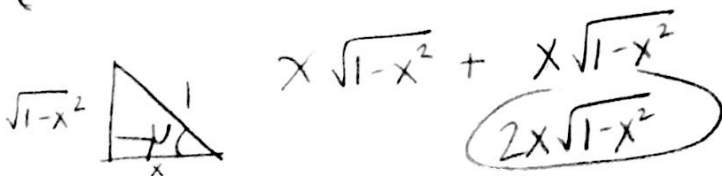
$$\frac{\tan u - \tan v}{1 + \tan u \tan v} = \frac{\frac{7}{24} - \frac{3}{4}}{1 + \frac{7}{24} \cdot \frac{3}{4}}$$

$$\frac{-\frac{11}{24}}{1 + \frac{21}{96}} = \frac{-\frac{11}{24}}{\frac{117}{96}} = \frac{-11}{24} \cdot \frac{96}{117} = \frac{-44}{117}$$

Write the trigonometric expression as an algebraic expression.

5. $\cos(\arccos x - \arcsin x)$

$$\cos(\arccos x) \cos(\arcsin x) + \sin(\arccos x) \sin(\arcsin x)$$



6. Find all solutions of the equation in the interval $[0, 2\pi)$. $\sin\left(x + \frac{\pi}{6}\right) - \sin\left(x - \frac{\pi}{6}\right) = \frac{1}{2}$

$$\sin x \cos \frac{\pi}{6} + \cos x \sin \frac{\pi}{6} - \left[\cancel{\sin x \cos \frac{\pi}{6}} - \cos x \sin \frac{\pi}{6} \right] = \frac{1}{2}$$

$$2 \cos x \sin \frac{\pi}{6} = \frac{1}{2}$$

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

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

$$x = \frac{\pi}{3}, \frac{5\pi}{3}$$

In 7 - 8, verify the identity.

7. $\sin(3\pi - x) = \sin x$

$$\sin 3\pi \cos x - \cos 3\pi \sin x$$

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

$$\sin x = \sin x \checkmark$$

8. $\cos(x + y) + \cos(x - y) = 2 \cos x \cos y$

$$\cos x \cos y - \cancel{\sin x \sin y} + \cos x \cos y + \cancel{\sin x \sin y}$$

$$2 \cos x \cos y = 2 \cos x \cos y \checkmark$$