Pre-Calculus
Section 5.4 Practice

Name: Key

For numbers 1 – 3, find the exact value of the expression.

1. $\cos\left(\frac{3\pi}{4}-\frac{\pi}{6}\right)$

$\cos\frac{3\pi}{4}\cos\frac{\pi}{6}+\sin\frac{3\pi}{4}\sin\frac{\pi}{6}$

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

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

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

2. $\sin\frac{7\pi}{12}$ $\left(\frac{3\pi}{12}+\frac{4\pi}{12}\right)$ or $\frac{\pi}{4}+\frac{\pi}{3}$

$\left(\sin\frac{\pi}{4}\right)\left(\cos\frac{\pi}{3}\right)+\left(\cos\frac{\pi}{4}\right)\left(\sin\frac{\pi}{3}\right)$

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

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

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

3. $\tan\left(\frac{4\pi}{3}-\frac{\pi}{4}\right)$

$\frac{\tan\frac{4\pi}{3}-\tan\frac{\pi}{4}}{1+\tan\frac{4\pi}{3}\tan\frac{\pi}{4}}$

$\frac{-\sqrt{3}-1}{1+(-\sqrt{3})(1)}$

$\frac{-\sqrt{3}-1(1+\sqrt{3})}{1-\sqrt{3}(1+\sqrt{3})}=\frac{-\sqrt{3}-\sqrt{9}-1-\sqrt{3}}{1-\sqrt{9}}$

$\frac{-4-2\sqrt{3}}{-2}$

$\frac{-2-\sqrt{3}}{-1}$ or $2+\sqrt{3}$

4. $\cos 75°$

$\cos(45°+30°)$

$\cos 45°\cos 30°-\sin 45°\sin 30°$

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

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

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

5. $\cos 105°$

$\cos(60+45°)$

$\cos 60°\cos 45°-\sin 60°\sin 45°$

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

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

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

6. $\sin(-15°)$

$\sin(30°-45°)$

$\sin 30°\cos 45°-\cos 30°\sin 45°$

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

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

For numbers 7 – 11, write each expression as the sine, cosine, or tangent of an angle. Then find the exact value of the expression (if possible).

7. $\dfrac{\tan 10^\circ + \tan 35^\circ}{1 - \tan 10^\circ \tan 35^\circ}$

$\tan(10^\circ + 35^\circ)$

1

8. $\cos\dfrac{5\pi}{18}\cos\dfrac{\pi}{9} + \sin\dfrac{5\pi}{18}\sin\dfrac{\pi}{9}$

$\cos\left(\frac{5\pi}{18} - \frac{\pi}{9}\right)$

$\cos\left(\frac{3\pi}{18}\right)$

$\cos\left(\frac{\pi}{6}\right)$

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

9. $\sin 75^\circ \cos 15^\circ + \cos 75^\circ \sin 15^\circ$

$\sin(75^\circ + 15^\circ)$

$\sin 90^\circ$

1

10. $\cos\dfrac{5\pi}{12}\cos\dfrac{\pi}{12} - \sin\dfrac{5\pi}{12}\sin\dfrac{\pi}{12}$

$\cos\left(\frac{5\pi}{12} + \frac{\pi}{12}\right)$

$\cos\left(\frac{6\pi}{12}\right)$

$\cos\left(\frac{\pi}{2}\right)$ 0

11. $\sin 3x \cos 2x - \cos 3x \sin 2x$

$\sin(3x - 2x)$

$\sin x$

For numbers 12 and 13, verify the given identity.

12. $\sin(x + \pi) = -\sin x$

$\sin x \cos\pi + \cos x \sin\pi$

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

$-\sin x = -\sin x$ ✓

13. $\cos\left(x + \dfrac{\pi}{2}\right) = -\sin x$

$\cos x \cos\frac{\pi}{2} - \sin x \sin\frac{\pi}{2}$

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

$-\sin x = -\sin x$ ✓