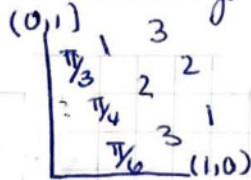


Sec 5.4 Sum & Difference Trig Formula pg 468 #1, 3, 15, 55, 57

#1) a)  $\cos(\frac{\pi}{6} + \frac{\pi}{3})$

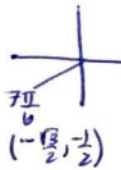


b)  $\cos \frac{\pi}{6} + \cos \frac{\pi}{3}$

$$\begin{aligned} & \cos \frac{\pi}{6} \cos \frac{\pi}{3} - \sin \frac{\pi}{6} \sin \frac{\pi}{3} \\ &= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right) \\ &= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} \\ &= \boxed{0} \end{aligned}$$

$$\begin{aligned} & \frac{\sqrt{3}}{2} + \frac{1}{2} \\ &= \boxed{\frac{\sqrt{3}+1}{2}} \end{aligned}$$

#3) a)  $\sin(\frac{7\pi}{6} - \frac{\pi}{3})$



b)  $\sin \frac{7\pi}{6} - \sin \frac{\pi}{3}$

$$\begin{aligned} & \sin \frac{7\pi}{6} \cos \frac{\pi}{3} - \cos \frac{7\pi}{6} \sin \frac{\pi}{3} \\ &= \frac{-1}{2}\left(\frac{1}{2}\right) - \left(-\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) \\ &= -\frac{1}{4} + \frac{3}{4} = \frac{2}{4} = \boxed{\frac{1}{2}} \end{aligned}$$

$$\begin{aligned} & -\frac{1}{2} - \frac{\sqrt{3}}{2} \\ &= \boxed{\frac{-1-\sqrt{3}}{2}} \end{aligned}$$

#15)  $\frac{11\pi}{12} = \frac{3\pi}{4} + \frac{\pi}{6}$

a)  $\sin \frac{11\pi}{12} = \sin(\frac{3\pi}{4} + \frac{\pi}{6})$

$$\begin{aligned} &= \sin \frac{3\pi}{4} \cos \frac{\pi}{6} + \cos \frac{3\pi}{4} \sin \frac{\pi}{6} \\ &= \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(-\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) \\ &= \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} \\ &= \boxed{\frac{\sqrt{6}-\sqrt{2}}{4}} \end{aligned}$$

b)  $\cos \frac{11\pi}{12} = \cos(\frac{3\pi}{4} + \frac{\pi}{6})$

$$\begin{aligned} & \cos \frac{3\pi}{4} \cos \frac{\pi}{6} - \sin \frac{3\pi}{4} \sin \frac{\pi}{6} \\ &= \left(-\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) \\ &= -\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} \\ &= \boxed{\frac{-\sqrt{6}-\sqrt{2}}{4}} \end{aligned}$$

c)  $\tan \frac{11\pi}{12} = \tan(\frac{3\pi}{4} + \frac{\pi}{6})$

$$\begin{aligned} &= \frac{\tan \frac{3\pi}{4} + \tan \frac{\pi}{6}}{1 - \tan \frac{3\pi}{4} \tan \frac{\pi}{6}} \\ &= \frac{-1 + (\sqrt{3}/3)}{1 - (-1)(\sqrt{3}/3)} \end{aligned}$$

$$\begin{aligned} & \frac{-\frac{3}{3} + \frac{\sqrt{3}}{3}}{\frac{3}{3} + \frac{\sqrt{3}}{3}} \\ &= \frac{-3+\sqrt{3}}{3+\sqrt{3}} \end{aligned}$$

$$\begin{aligned} & \frac{-3+\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}} \\ &= \frac{-3+\sqrt{3}}{3+\sqrt{3}} \cdot \frac{(3-\sqrt{3})}{(3-\sqrt{3})} \\ &= \frac{-12+6\sqrt{3}}{6} = \boxed{-2+\sqrt{3}} \end{aligned}$$

$$\#55) \sin(x + \frac{\pi}{3}) + \sin(x - \frac{\pi}{3}) = 1$$

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

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

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

$$\sin x = 1$$

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

$$\#57) \cos(x + \frac{\pi}{4}) - \cos(x - \frac{\pi}{4}) = 1$$

$$\cos x \cos \frac{\pi}{4} - \sin x \sin \frac{\pi}{4} - (\cos x \cos \frac{\pi}{4} + \sin x \sin \frac{\pi}{4}) = 1$$

$$\cancel{\cos x \cos \frac{\pi}{4}} - \sin x \sin \frac{\pi}{4} - \cancel{\cos x \cos \frac{\pi}{4}} - \sin x \sin \frac{\pi}{4} = 1$$

$$-2 \sin x \sin \frac{\pi}{4} = 1$$

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

$$-\sin x \sqrt{2} = 1$$

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

$$\sin x = -\frac{\sqrt{2}}{2}$$

$$\boxed{x = \frac{5\pi}{4}, \frac{7\pi}{4}}$$

