



$$1. \sin\left(\frac{11\pi}{12}\right) = \sin\left(\frac{\alpha}{12} + \frac{\beta}{12}\right)$$

RECALL $\sin(\alpha + \beta) = \sin\alpha \cos\beta + \cos\alpha \sin\beta$

$$= \sin\frac{9\pi}{12} \cos\frac{2\pi}{12} + \cos\frac{9\pi}{12} \sin\frac{2\pi}{12}$$

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

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

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

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

$$2. \tan\left(\frac{17\pi}{12}\right)$$

$$= \tan\left(\frac{9\pi}{12} + \frac{8\pi}{12}\right)$$

$$= \tan\left(\frac{3\pi}{4} + \frac{2\pi}{3}\right)$$

RECALL
 $\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta}$
 $= \frac{\tan\frac{3\pi}{4} + \tan\frac{2\pi}{3}}{1 - \tan\frac{3\pi}{4} \tan\frac{2\pi}{3}}$

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

$$= \frac{-1 - \sqrt{3}}{1 - \sqrt{3}}$$

$$= \frac{-1 - \sqrt{3}}{1 - \sqrt{3}} \cdot \frac{1 + \sqrt{3}}{1 + \sqrt{3}}$$

$$= \frac{-1 - \sqrt{3} - \sqrt{3} + 3}{1 - 3}$$

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

$$= \frac{1 - \sqrt{3}}{-1}$$

$$= -1 + \sqrt{3}$$