

$$1. \cos 112.5^\circ \cdot \cos 22.5^\circ$$

$$\downarrow \left[\cos \alpha \cos \beta = \frac{1}{2} [\cos (\alpha - \beta) + \cos (\alpha + \beta)] \right]$$

$$= \frac{1}{2} [\cos (112.5^\circ - 22.5^\circ) + \cos (112.5^\circ + 22.5^\circ)]$$

$$= \frac{1}{2} [\cos 90^\circ + \cos 135^\circ]$$

$$= \frac{1}{2} [0 + -\frac{\sqrt{2}}{2}]$$

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

$$2. \sin \frac{7\pi}{12} - \sin \frac{\pi}{12}$$

$$\downarrow \sin \alpha - \sin \beta = 2 \sin \frac{\alpha - \beta}{2} \cos \frac{\alpha + \beta}{2}$$

$$= 2 \sin \frac{\frac{7\pi}{12} - \frac{\pi}{12}}{2} \cos \frac{\frac{7\pi}{12} + \frac{\pi}{12}}{2}$$

$$= 2 \sin \frac{\frac{6\pi}{12}}{2} \cos \frac{\frac{8\pi}{12}}{2}$$

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

$$= 2 \sin \frac{\pi}{4} \cos \frac{2\pi}{6}$$

$$= 2 \sin \frac{\pi}{4} \cos \frac{\pi}{3}$$

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

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