

$$2. \cos 2u = 2\cos^2 u - 1$$

$$\cos(u+u) =$$

$$\cos u \cos u - \sin u \sin u =$$

$$\cos^2 u - \sin^2 u =$$

$$\cos^2 u - (1 - \cos^2 u) =$$

$$2\cos^2 u - 1 \quad \checkmark$$

$$15. \sin 4x = 2\sin 2x \cos 2x$$

$$u = 2x$$

$$\sin 2(2x) =$$

$$2\sin 2x \cos 2x \quad \checkmark$$

$$4. \tan 2u = \frac{2 \tan u}{1 - \tan^2 u}$$

$$\tan(u+u) =$$

$$\frac{\tan u + \tan u}{1 - \tan u \tan u} =$$

$$\frac{2 \tan u}{1 - \tan^2 u} \quad \checkmark$$

$$16. \cos 6x = 2\cos^2 3x - 1$$

$$u = 3x$$

$$\cos 2(3x) =$$

$$2\cos^2 3x - 1 \quad \checkmark$$

$$31. \sin 15^\circ = \sin \frac{30^\circ}{2} \quad u = 30^\circ$$

$$\text{Quad 1} \rightarrow x = \pm \sqrt{\frac{1 - \cos 30}{2}}$$

$$= \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$

$$= \sqrt{\frac{2 - \sqrt{3}}{2}} = \sqrt{\frac{2\sqrt{3}}{2} \cdot \frac{1}{2}}$$

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

$$33. \cos 75^\circ = \cos \frac{150}{2}$$

$$\text{Quad 1} \rightarrow \text{pos} = \pm \sqrt{\frac{1 + \cos 150}{2}}$$

$$= \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}} = \boxed{\frac{\sqrt{2 - \sqrt{3}}}{2}}$$

$$32. \tan 195^\circ = \tan \frac{390^\circ}{2} = \tan \frac{30^\circ}{2}$$

$$= \frac{1 - \cos 30}{\sin 30}$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{2 - \sqrt{3}}{2} \cdot 2 = \boxed{2 - \sqrt{3}}$$

$$34. \sin \left( \frac{5\pi}{12} \right) = \sin \frac{10\pi}{12} = \frac{5\pi}{6}$$

$$\text{Quad 1} \rightarrow + = \pm \sqrt{\frac{1 - \cos \frac{5\pi}{6}}{2}} = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}}$$

$$= \boxed{\frac{\sqrt{2 + \sqrt{3}}}{2}}$$

$$35. \tan\left(\frac{7\pi}{12}\right) = \tan \frac{14\pi}{24} = \frac{7\pi}{6}$$

$$= \frac{1 - \cos \frac{7\pi}{6}}{\sin \frac{7\pi}{6}} = \frac{1 - -\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$$
$$= \frac{2 + \sqrt{3}}{2} \cdot -2 = \boxed{-2 - \sqrt{3}}$$

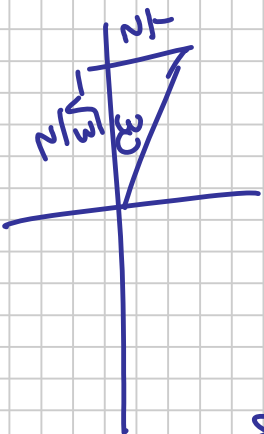
$$36. \cos \frac{\pi}{8} = \cos \frac{\pi}{2}$$

Quadrant 1

$$= \sqrt{\frac{1 + \cos \frac{\pi}{4}}{2}}$$
$$= \sqrt{\frac{1 + \frac{\sqrt{2}}{2}}{2}} = \sqrt{\frac{2 + \sqrt{2}}{2}} = \boxed{\frac{\sqrt{2 + \sqrt{2}}}{2}}$$

$$\textcircled{34} \sin\left(\frac{5\pi}{12}\right) = \sin\left(\frac{\frac{10\pi}{12}}{2}\right) = \sqrt{\frac{1 - \cos\frac{5\pi}{6}}{2}} = \sqrt{\frac{2 \cdot \left|1 - \frac{\sqrt{3}}{2}\right|}{2 \cdot 2}}$$

$$u = \frac{10\pi}{12} = \frac{5\pi}{6}$$



$$= \sqrt{\frac{2+\sqrt{3}}{4}} = \sqrt{\frac{\sqrt{2+\sqrt{3}}}{2}}$$

$$\textcircled{12} \sin 2\theta + \cos 2\theta = 2 \sin\theta \cos\theta + \sqrt{1 - 2 \sin^2\theta}$$

SKIP  $\pi!$