

5-4-1

341: 1-3, 6, 11-13, 17-19, 72, 73

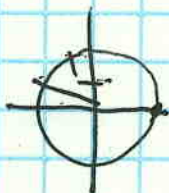
1.  $\cos 75^\circ = \cos(45^\circ + 30^\circ)$

$$\cos(45^\circ + 30^\circ) = \cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ$$

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

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

2.  $\sin(-210^\circ) = \sin(150^\circ - 360^\circ)$



$$\sin(150^\circ - 360^\circ) = \sin(150^\circ) \cos(-360^\circ) - \cos(150^\circ) \sin(-360^\circ)$$

$$\left(\frac{1}{2}\right)(1) - \left(\frac{\sqrt{3}}{2}\right)(0) = \frac{1}{2}$$

3.  $\sin \frac{11\pi}{12} = \sin\left(\frac{3\pi}{12} + \frac{8\pi}{12}\right) = \sin\left(\frac{\pi}{4} + \frac{2\pi}{3}\right)$

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

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

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

6.  $\tan\left(\frac{\pi}{3} - \frac{\pi}{4}\right) = \tan\left(\frac{4}{12} - \frac{3}{12}\right) = \tan\left(\frac{\pi}{3} - \frac{\pi}{4}\right)$

$$\tan\left(\frac{\pi}{3} - \frac{\pi}{4}\right) = \frac{\tan\frac{\pi}{3} - \tan\frac{\pi}{4}}{1 + \tan\frac{\pi}{3}\tan\frac{\pi}{4}} = \frac{\sqrt{3} - 1}{1 + \sqrt{3}(1)} \cdot \frac{(1 - \sqrt{3})}{(1 - \sqrt{3})}$$

$$\frac{2 - \sqrt{3}}{1 - 3} \leftarrow \frac{2\sqrt{3} - 4}{-2} \leftarrow \frac{\sqrt{3} - 1 + \sqrt{3} - 3}{1 - 3}$$

$$11. \frac{\tan 43^\circ - \tan 13^\circ}{1 + \tan 43^\circ \tan 13^\circ} = \tan(43^\circ - 13^\circ) = \tan 30^\circ = \boxed{\frac{\sqrt{3}}{3}}$$

$$12. \cos\left(\frac{5\pi}{12}\right)\cos\left(\frac{\pi}{4}\right) + \sin\left(\frac{5\pi}{12}\right)\sin\left(\frac{\pi}{4}\right) \\ = \cos\left(\frac{5\pi}{12} - \frac{\pi}{4}\right) = \cos\left(\frac{5\pi}{12} - \frac{3\pi}{12}\right) = \cos\frac{\pi}{6} = \boxed{\frac{\sqrt{3}}{2}}$$

$$13. \sin 15^\circ \cos 75^\circ + \cos 15^\circ \sin 75^\circ = \sin(15^\circ + 75^\circ) \\ = \sin 90^\circ = \boxed{1}$$

$$17. \frac{\tan 2\theta - \tan \theta}{1 + \tan 2\theta \tan \theta} = \tan(2\theta - \theta) = \boxed{\tan \theta}$$

$$18. \cos \frac{\pi}{2} \cos x + \sin \frac{\pi}{2} \sin x = \boxed{\cos\left(\frac{\pi}{2} - x\right)} = \boxed{\sin(x)}$$

$$19. \sin 3y \cos y + \cos 3y \sin y = \sin(3y + y) = \boxed{\sin 4y}$$

$$72. \sin^{-1}(-1) = \boxed{-\frac{\pi}{2}} \quad 73. \tan^{-1}\sqrt{3} = \boxed{\frac{\pi}{3}}$$