

W Day 3 :

$$1) \sin \frac{\pi}{6} = \frac{1}{2}$$

$$2) \cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$$

$$3) \sin \frac{8\pi}{3} = \frac{\sqrt{3}}{2}$$

$$4) \tan \frac{3\pi}{4} = -1$$

$$5) \arccos\left(\frac{1}{2}\right) \\ = \frac{\pi}{3}, \frac{5\pi}{3}$$

$$6) \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) \\ = \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$7) \arctan(\sqrt{3}) \\ = \frac{\pi}{3}, \frac{4\pi}{3}$$

$$8) \cos^{-1}(-1) \\ = \pi$$

$$9) \tan \theta = 1 \\ \theta = \frac{\pi}{4}, \frac{5\pi}{4}$$

$$10) \csc \theta = \sqrt{2} \\ \sin \theta = \frac{\sqrt{2}}{2} \\ \theta = \frac{\pi}{4}, \frac{3\pi}{4}$$

$$11) \arcsin(-1) \\ = \frac{3\pi}{2}$$

$$12) \arctan\left(\frac{\sqrt{3}}{3}\right) \\ = \frac{\pi}{6}, \frac{7\pi}{6}$$

$$13) 2\sin^2 x + 3\sin x + 1 = 0 \\ (2\sin x + 1)(\sin x + 1) = 0 \\ 2\sin x + 1 = 0 \quad \sin x + 1 = 0 \\ \sin x = -\frac{1}{2} \quad \sin x = -1 \\ x = \frac{7\pi}{6}, \frac{11\pi}{6} \quad x = \frac{3\pi}{2}$$

$$14) 4\sin^2 x = 2\cos x + 1 \\ 4(1 - \cos^2 x) = 2\cos x + 1 \\ 4 - 4\cos^2 x = 2\cos x + 1 \\ 0 = 4\cos^2 x + 2\cos x - 3 \\ \text{calc: } x = .8614, 5.422$$

$$15) \frac{\cos x \cot x}{1 - \sin x} = 3$$

$$3 - 3 \sin x = \cos x \cdot \frac{\cos x}{\sin x}$$

$$3 - 3 \sin x = \frac{\cos^2 x}{\sin x}$$

$$3 \sin x - 3 \sin^2 x = \cos^2 x$$

$$3 \sin x - 3 \sin^2 x = 1 - \sin^2 x$$

$$3 \sin x - 2 \sin^2 x - 1 = 0$$

$$2 \sin^2 x - 3 \sin x + 1 = 0$$

$$(2 \sin x - 1)(\sin x - 1) = 0$$

$$\sin x = \frac{1}{2} \quad \sin x = 1$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6} \quad x = \frac{\pi}{2}$$

$$16) 2 \sin^2 \theta - \sin \theta - 1 = 0$$

$$(2 \sin \theta + 1)(\sin \theta - 1) = 0$$

$$2 \sin \theta = -1 \quad \sin \theta = 1$$

$$\sin \theta = -\frac{1}{2} \quad \theta = \frac{\pi}{2}$$

$$\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$18) \sin^2 \theta - 1 = 0$$

$$\sqrt{\sin^2 \theta} = \sqrt{1}$$

$$\sin \theta = \pm 1$$

$$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$19) \csc x + \cot x = 1$$

$$\frac{1}{\sin x} + \frac{\cos x}{\sin x} = 1$$

$$\frac{1 + \cos x}{\sin x} = 1$$

$$\sin x = 1 + \cos x$$

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

$$17) 1 + \sin \theta = 2 \cos^2 \theta$$

$$1 + \sin \theta = 2(1 - \sin^2 \theta)$$

$$1 + \sin \theta = 2 - 2 \sin^2 \theta$$

$$2 \sin^2 \theta + \sin \theta - 1 = 0$$

$$(2 \sin \theta - 1)(\sin \theta + 1) = 0$$

$$\sin \theta = \frac{1}{2} \quad \sin \theta = -1$$

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6} \quad \theta = \frac{3\pi}{2}$$

$$20) \sec^2 x + 0.5 \tan x = 1$$

$$1 + \tan^2 x + 0.5 \tan x = 1$$

$$\tan x (\tan x + 0.5) = 0$$

$$\tan x = 0 \quad \tan x = -\frac{1}{2}$$

$$x = 0, \pi \quad x = -0.464$$

$$\sin^2 x = 1 + 2 \cos x + \cos^2 x$$

$$1 - \cos^2 x = 1 + 2 \cos x + \cos^2 x$$

$$0 = 2 \cos x + 2 \cos^2 x$$

$$0 = 2 \cos x (1 + \cos x)$$

$$2 \cos x = 0 \quad 1 + \cos x = 0$$

$$\cos x = 0 \quad \cos x = -1$$

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

$$x = \pi$$

$$21) \cos x + \tan x \sin x$$

$$\cos x + \frac{\sin x}{\cos x} \cdot \sin x$$

$$\cos x + \frac{\sin^2 x}{\cos x}$$

$$\frac{\cos^2 x}{\cos x} + \frac{\sin^2 x}{\cos x}$$

$$\frac{1}{\cos x} = \boxed{\sec x}$$

$$22) \sin^3 x + \sin x \cos^2 x$$

$$\sin^3 x + \sin x (1 - \sin^2 x)$$

$$\cancel{\sin^3 x} + \sin x - \cancel{\sin^3 x}$$

$$= \boxed{\sin x}$$

$$23) \frac{\csc x - \sin x}{\csc x}$$

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

$$\frac{1 - \sin^2 x}{1}$$

$$= \boxed{\cos^2 x}$$

$$24) \frac{\sin x}{\cos x} + \frac{\cos x}{1 + \sin x}$$

$$\frac{\sin x (1 + \sin x) + \cos x (\cos x)}{(\cos x)(1 + \sin x)}$$

$$\frac{\cancel{\sin x} + \cancel{\sin^2 x} + \cos^2 x}{(\cos x)(1 + \sin x)}$$

$$\frac{\cancel{(\sin x + 1)}}{(\cos x)(\cancel{1 + \sin x})} = \frac{1}{\cos x}$$

$$= \boxed{\sec x}$$