

$$1) \quad \sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A+A) = \sin A \cos A + \cos A \sin A$$

$$\sin(2A) = 2 \sin A \cos A$$

$$1b) \quad \cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A+A) = \cos A \cos A - \sin A \sin A$$

$$\cos(2A) = \cos^2 A - \sin^2 A$$

$$c) i) \quad \cos 2A = \cos^2 A - \sin^2 A$$

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

$$= 2\cos^2 A - 1$$

$$ii) \quad \cos 2A = \cos^2 A - \sin^2 A$$

$$= (1 - \sin^2 A) - \sin^2 A$$

$$= 1 - 2\sin^2 A$$

$$d) \quad \tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A+A) = \frac{\tan A + \tan A}{1 - \tan A \tan A}$$

$$\tan(2A) = \frac{2 \tan A}{1 - \tan^2 A}$$

$$2a) \quad \sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(2\theta + \theta) = \sin 2\theta \cos \theta + \cos 2\theta \sin \theta$$

$$\begin{aligned} &= 2 \sin \theta \cos \theta \cos \theta + \sin \theta (\cos^2 \theta - \sin^2 \theta) \\ &= 2 \sin \theta \cos^2 \theta + \sin \theta (1 - 2 \sin^2 \theta) \\ &= 2 \sin \theta (1 - \sin^2 \theta) + \sin \theta (1 - 2 \sin^2 \theta) \\ &= 2 \sin \theta - 2 \sin^3 \theta + \sin \theta - 2 \sin^3 \theta \\ &= 3 \sin \theta - 4 \sin^3 \theta \end{aligned}$$

$$b) \quad \sin 3\theta = 0.4$$

$$3\theta = 23.578, 156.422, 383.578, 516.422$$

$$\theta = \underline{\underline{7.9}}, \underline{\underline{52.1}}, \underline{\underline{127.9}}, \underline{\underline{172.1}}$$

$$3a) \quad \cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\begin{aligned} \cos(2\theta + \theta) &= \cos 2\theta \cos \theta - \sin 2\theta \sin \theta \\ &= (2 \cos^2 \theta - 1) \cos \theta - 2 \sin \theta \cos \theta \sin \theta \\ &= 2 \cos^3 \theta - \cos \theta - 2 \cos \theta \sin^2 \theta \\ &= 2 \cos^3 \theta - \cos \theta - 2 \cos \theta (1 - \cos^2 \theta) \\ &= 2 \cos^3 \theta - \cos \theta - 2 \cos \theta + 2 \cos^3 \theta \\ &= 4 \cos^3 \theta - 3 \cos \theta \end{aligned}$$

$$b) \quad \cos 3\theta = 0.5$$

$$3\theta = \frac{1}{3}\pi, \frac{5}{3}\pi, \frac{7}{3}\pi$$

$$\theta = \frac{1}{9}\pi, \frac{5}{9}\pi, \frac{7}{9}\pi$$

4)

$$\begin{aligned} \cos 2x - 7 \sin x + 3 &= 0 \\ 1 - 2 \sin^2 x - 7 \sin x + 3 &= 0 \\ -2 \sin^2 x - 7 \sin x + 4 &= 0 \\ 2 \sin^2 x + 7 \sin x - 4 &= 0 \\ (2 \sin x - 1)(\sin x + 4) &= 0 \\ \sin x = \frac{1}{2} \quad \sin x = -4 & \\ & \quad \quad \quad x \end{aligned}$$

$$x = \underline{\underline{\frac{1}{6} \pi}}, \underline{\underline{\frac{5}{6} \pi}}$$

5)

$$8 \sin x \cos x = 3$$

$$4 \sin 2x = 3$$

$$\sin 2x = \frac{3}{4}$$

$$2x = 48.6, 131.4, 408.6, 491.4$$

$$x = \underline{\underline{24.3}}, \underline{\underline{65.7}}, \underline{\underline{204.3}}, \underline{\underline{245.7}}$$

6)

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

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

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

$$\cos x - \sin x$$