

$$1 \quad \text{(a)} \quad \sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\text{(b)} \quad \sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\text{(c)} \quad \cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\text{(d)} \quad \cos(A-B) = \cos A \cos B + \sin A \sin B$$

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

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

$$\text{(g)} \quad \cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$$

$$\text{(h)} \quad \cot(A-B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$$

$$2. \quad \text{(a)} \quad \sin 2A = 2 \sin A \cos A = \frac{2 \tan A}{1 + \tan^2 A}$$

$$\text{(b)} \quad \cos 2A = \cos^2 A - \sin^2 A = 1 - 2 \sin^2 A = 2 \cos^2 A - 1 = \frac{1 - \tan^2 A}{1 + \tan^2 A}$$

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

$$3. \quad \text{(a)} \quad \sin 3A = 3 \sin A - 4 \sin^3 A \quad \text{and} \quad \cos 3A = 4 \cos^3 A - 3 \cos A$$

$$\text{(b)} \quad \tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A} \quad \text{and} \quad \cot 3A = \frac{\cot^3 A - 3 \cot A}{3 \cot^2 A - 1}$$

$$\text{(c)} \quad \cos A + \cos B = 2 \cos \left(\frac{A+B}{2} \right) \cos \left(\frac{A-B}{2} \right)$$

$$\text{(d)} \quad \cos A - \cos B = 2 \sin \left(\frac{A+B}{2} \right) \sin \left(\frac{B-A}{2} \right)$$

$$(e) \sin A + \sin B = 2 \sin \left(\frac{A+B}{2} \right) \cos \left(\frac{A-B}{2} \right)$$

$$(f) \sin A - \sin B = 2 \cos \left(\frac{A+B}{2} \right) \sin \left(\frac{A-B}{2} \right)$$

$$4. \quad (a) 2 \sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$(b) 2 \cos A \sin B = \sin(A+B) - \sin(A-B)$$

$$(c) 2 \cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$(d) 2 \sin A \sin B = \cos(A-B) - \cos(A+B)$$

$$5 \quad \sin^2 \theta + \cos^2 \theta = 1$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$