(7) $\cos 3A = 4\cos^3 A - 3\cos A$

(8) $\tan 3A = \frac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$

Sub-multiple Angles

(1) $\sin 18° = \cos 72° = \frac{\sqrt{5}-1}{4}$

(2) $\sin 36° = \cos 54° = \frac{1}{4}\sqrt{10 - 2\sqrt{5}}$

(3) $\sin 54° = \cos 36° = \frac{\sqrt{5}+1}{4}$

(4) $\sin 72° = \cos 18° = \frac{1}{4}\sqrt{10 + 2\sqrt{5}}$

Trigonometric Equations

(1) (i) $If\ \sin\theta = 0,\ then\ \theta = n\pi$

(ii) $If\ \sin\theta = \sin\alpha,\ then\ \theta = n\pi + (-1)^n\alpha$

(2) (i) $\cos\theta = 0,\ then\ \theta = (2n+1)\frac{\pi}{2}$

(ii) $\cos\theta = \cos\alpha,\ then\ \theta = 2n\pi \pm \alpha$

(3) (i) $\tan\theta = 0,\ then\ \theta = n\pi$

(ii) $\tan\theta = \tan\alpha,\ then\ \theta = n\pi + \alpha$

Inverse Circular Function

Principle Value→ $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(1) $\sin(\sin^{-1}x) = x$; $\cos(\cos^{-1}x) = x$; $\tan(\tan^{-1}x) = x$

(2) $\sin^{-1}(-x) = -\sin^{-1}x$; $\cos^{-1}(-x) = \pi - \cos^{-1}x$; $\tan^{-1}(-x) = -\tan^{-1}x$;

$\cot^{-1}(-x) = \pi - \cot^{-1}x$; $\text{cosec}^{-1}(-x) = -\text{cosec}^{-1}x$; $\sec^{-1}(-x) = \pi - \sec^{-1}x$.

(3) $\sin^{-1}x = \text{cosec}^{-1}\frac{1}{x}$; $\cos^{-1}x = \sec^{-1}\frac{1}{x}$; $\tan^{-1}x = \cot^{-1}\frac{1}{x}\ \ when\ x > 0$ &

$\tan^{-1}x = \cot^{-1}\frac{1}{x} - \pi\ \ when\ x < 0.$

(4) (i) $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}\ \ (-1 \le x \le 1)$

(ii) $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}\ \ (-\infty < x < \infty)$

(iii) $\sec^{-1}x + \text{cosec}^{-1}x = \frac{\pi}{2}\ \ (x \le -1,\ or,\ x \ge 1)$

(5) $\tan^{-1}x \pm \tan^{-1}y = \tan^{-1}\left(\frac{x \pm y}{1 \mp xy}\right)$ $[At\ principal\ value]$

(6) $\sin^{-1}x \pm \sin^{-1}y = \sin^{-1}\left(x\sqrt{1-y^2} \pm y\sqrt{1-x^2}\right)$ $[At\ principal\ value]$

(7) $\cos^{-1}x \pm \cos^{-1}y = \cos^{-1}\left(xy \mp \sqrt{(1-x^2)(1-y^2)}\right)$ $[At\ principal\ value]$

(8) $2\tan^{-1}x = \sin^{-1}\left(\frac{2x}{1+x^2}\right) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$