

$$1 + \tan^2 x = \frac{1}{\cos^2 x} \quad \cos^2 x + \sin^2 x = 1 \quad \tan x = \frac{\sin x}{\cos x}$$

$$\tan(x + k\pi) = \tan x \quad \sin(x + 2k\pi) = \sin x \quad \cos(x + 2k\pi) = \cos x$$

$$\tan(-x) = -\tan x \quad \sin(-x) = -\sin x \quad \cos(-x) = \cos x$$

$$\cos(\pi + x) = -\cos x$$

$$\sin(\pi + x) = -\sin x$$

$$\tan(\pi + x) = \tan x$$

$$\cos(\pi - x) = -\cos x$$

$$\sin(\pi - x) = \sin x$$

$$\tan(\pi - x) = -\tan x$$

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

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

$$\tan\left(\frac{\pi}{2} + x\right) = -\frac{1}{\tan x}$$

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

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

$$\tan\left(\frac{\pi}{2} - x\right) = \frac{1}{\tan x}$$

$$(\forall x \in \mathbb{R}) : -1 \leq \cos x \leq 1 ; \quad -1 \leq \sin x \leq 1$$

$$-\tan \alpha = \tan(-\alpha) \quad -\sin \alpha = \sin(-\alpha) \quad -\cos \alpha = \cos(\pi - \alpha)$$

$$\cos \alpha = \sin\left(\frac{\pi}{2} - \alpha\right) \quad \sin \alpha = \cos\left(\frac{\pi}{2} - \alpha\right)$$

(b) علاقة Simus في المثلث

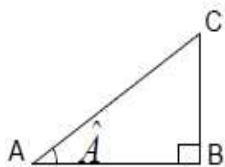
ليكن (ABC) مثلثا و R شعاع الدائرة المحيطة به

لدينا

$$\frac{AB}{\sin \hat{C}} = \frac{AC}{\sin \hat{B}} = \frac{BC}{\sin \hat{A}} = 2R$$

(6) العلاقات المترية في مثلث قائم الزاوية

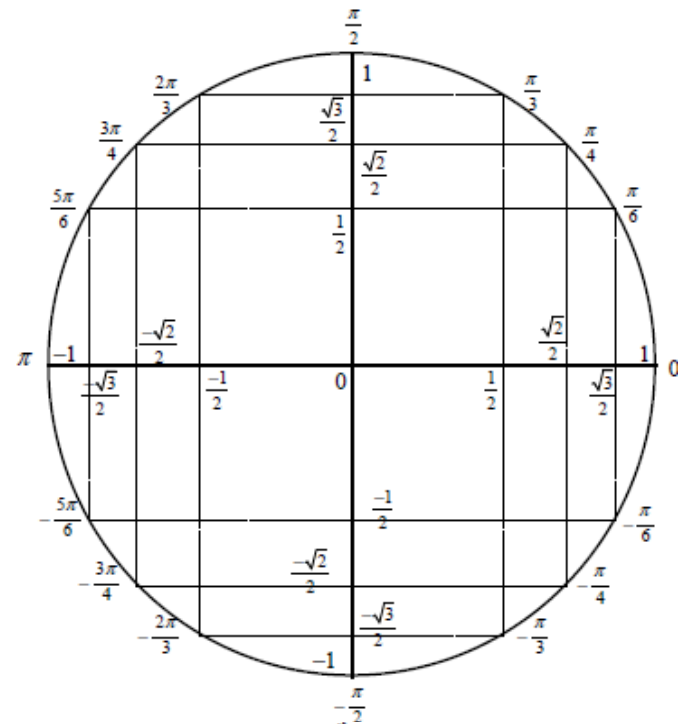
(a) ليكن (ABC) مثلثا قائم الزاوية في B



$$\tan \hat{A} = \frac{BC}{AB}$$

$$\cos \hat{A} = \frac{AB}{AC}$$

$$\sin \hat{A} = \frac{BC}{AC}$$



جدول النسب الإعتيادية

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan x$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0

(3) المعادلات المثلثية.

$$\cos x = 1 \Leftrightarrow x = 2k\pi$$

$$\cos x = -1 \Leftrightarrow x = \pi + 2k\pi \quad \cos x = \cos \alpha \Leftrightarrow \begin{cases} x = \alpha + 2k\pi \\ x = -\alpha + 2k\pi \end{cases} \quad (a)$$

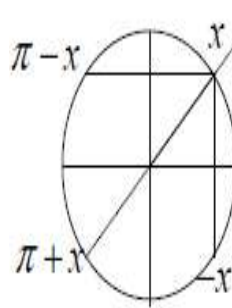
$$\cos x = 0 \Leftrightarrow x = \frac{\pi}{2} + k\pi$$

$$\sin x = 1 \Leftrightarrow x = \frac{\pi}{2} + 2k\pi$$

$$\sin x = -1 \Leftrightarrow x = -\frac{\pi}{2} + 2k\pi \quad (b)$$

$$\sin x = 0 \Leftrightarrow x = k\pi$$

$$\sin x = \sin \alpha \Leftrightarrow \begin{cases} x = \alpha + 2k\pi \\ x = \pi - \alpha + 2k\pi \end{cases}$$



$$\tan x = \tan \alpha \Leftrightarrow x = \alpha + k\pi \quad (c)$$