ثانوية بئر أنزران . صفرو .
2011 – 2012

الحساب المثلثي

2 بكالوريا علوم فيزيائية 1
ذ: توفيق بنعمرو

$\sin(x+2k\pi)=\sin(x)$
$\cos(x+2k\pi)=\cos(x)$
$\tan(x+k\pi)=\tan(x)$
$k\in\mathbb{Z}$

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

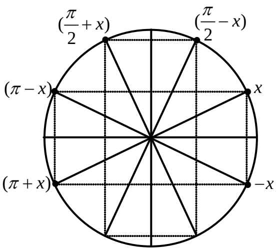
$\sin(\pi+x)=-\sin(x)$
$\cos(\pi+x)=-\cos(x)$
$\tan(\pi+x)=\tan(x)$

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

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

$(\sin x=\sin a)\Leftrightarrow (x\in\{a+2k\pi / k\in\mathbb{Z}\}\cup\{\pi-a+2k\pi / k\in\mathbb{Z}\})$
$(\cos x=\cos a)\Leftrightarrow (x\in\{a+2k\pi / k\in\mathbb{Z}\}\cup\{-a+2k\pi / k\in\mathbb{Z}\})$
$(\tan x=\tan a)\Leftrightarrow x\in\{a+k\pi / k\in\mathbb{Z}\}$

$t=\tan(\frac{a}{2})$: $\sin a=\dfrac{2t}{1+t^2}$ $\cos a=\dfrac{1-t^2}{1+t^2}$ $\tan a=\dfrac{2t}{1-t^2}$



$\sin(\frac{\pi}{2}-x)=\cos(x)$
$\cos(\frac{\pi}{2}-x)=\sin(x)$
$\tan(\frac{\pi}{2}-x)=\dfrac{1}{\tan(x)}$

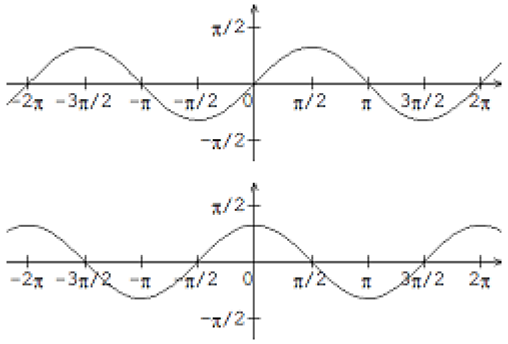
$\sin(\frac{\pi}{2}+x)=\cos(x)$
$\cos(\frac{\pi}{2}+x)=-\sin(x)$
$\tan(\frac{\pi}{2}+x)=-\dfrac{1}{\tan(x)}$

$\sin 2a=2\sin a\cos a$
$\cos 2a=\cos^2 a-\sin^2 a$
$\cos 2a=2\cos^2 a-1$
$\cos 2a=1-2\sin^2 a$
$\tan 2a=\dfrac{2\tan a}{1-\tan^2 a}$

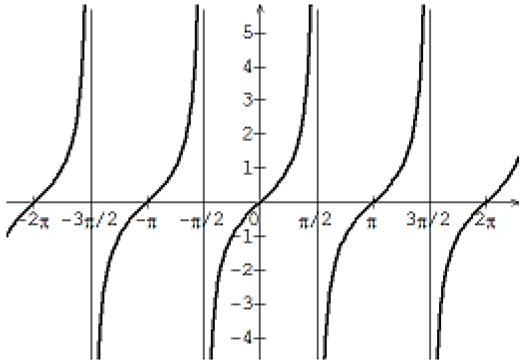
$\sin(a+b)=\sin a\cos b+\cos a\sin b$
$\sin(a-b)=\sin a\cos b-\cos a\sin b$
$\cos(a+b)=\cos a\cos b-\sin a\sin b$
$\cos(a-b)=\cos a\cos b+\sin a\sin b$
$\tan(a+b)=\dfrac{\tan a+\tan b}{1-\tan a\tan b}$
$\tan(a-b)=\dfrac{\tan a-\tan b}{1+\tan a\tan b}$

$\sin a+\sin b=2\sin(\frac{a+b}{2})\cos(\frac{a-b}{2})$
$\sin a-\sin b=2\cos(\frac{a+b}{2})\sin(\frac{a-b}{2})$
$\cos a+\cos b=2\cos(\frac{a+b}{2})\cos(\frac{a-b}{2})$
$\cos a-\cos b=-2\sin(\frac{a+b}{2})\sin(\frac{a-b}{2})$

$\sin a\sin b=\frac{1}{2}(\cos(a-b)-\cos(a+b))$
$\sin a\cos b=\frac{1}{2}(\sin(a+b)+\sin(a-b))$
$\cos a\cos b=\frac{1}{2}(\cos(a+b)+\cos(a-b))$



بالتوفيق



x deg	0	30	45	60	90	120	135	150	180
x rad	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
$\sin x$	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
$\cos x$	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
$\tan x$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	||	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0

$\sin'(x)=\cos(x)$
$\cos'(x)=-\sin(x)$
$\tan'(x)=1+\tan^2(x)$

$(\sin(u(x)))'=u'(x)\cdot\cos(u(x))$
$(\cos(u(x)))'=-u'(x)\cdot\sin(u(x))$
$(\tan(u(x)))'=u'(x)\cdot(1+\tan^2(u(x)))$

$\lim\limits_{x\to 0}\dfrac{\sin x}{x}=1$
$\lim\limits_{x\to 0}\dfrac{1-\cos x}{x^2}=\dfrac{1}{2}$
$\lim\limits_{x\to 0}\dfrac{\tan x}{x}=1$

$\lim\limits_{u(x)\to 0}\dfrac{\sin(u(x))}{u(x)}=1$
$\lim\limits_{u(x)\to 0}\dfrac{1-\cos(u(x))}{(u(x))^2}=\dfrac{1}{2}$
$\lim\limits_{u(x)\to 0}\dfrac{\tan(u(x))}{u(x)}=1$