1-3 Trigonometric Functions

師大工教一

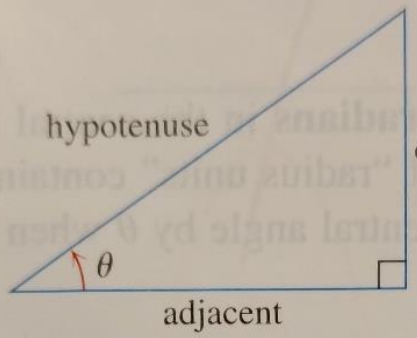
Degrees vs. radians

1. $s = r\theta$ (θ in radians)

2. $\pi = 180^\circ$

度度量 弧度量

$S = r\theta$



$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \csc\theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \sec\theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

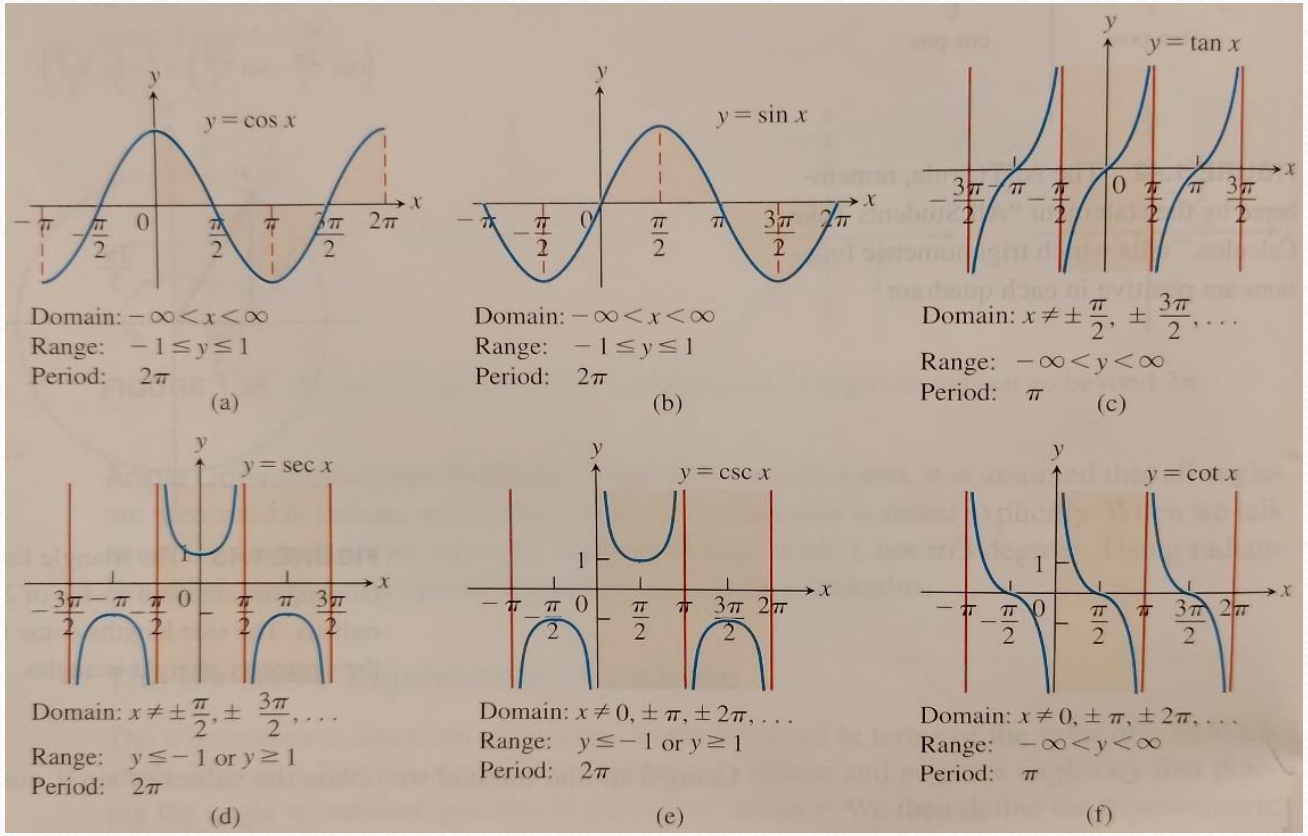
0	30	45	60	90
0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	

Definition A function $f(x)$ is periodic if there is a positive number p such that $f(x+p)=f(x)$ for every value of x. The smallest of p is the period of f.

周期

periodic functions 周期函数

period 周期


y = cos x
Domain: $-\infty < x < \infty$
Range: $-1 \le y \le 1$
Period: 2π
(a)
y = sin x
Domain: $-\infty < x < \infty$
Range: $-1 \le y \le 1$
Period: 2π
(b)
y = tan x
Domain: $x \ne \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$
Range: $-\infty < y < \infty$
Period: π
(c)
y = sec x
Domain: $x \ne \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots$
Range: $y \le -1$ or $y \ge 1$
Period: 2π
(d)
y = csc x
Domain: $x \ne 0, \pm\pi, \pm 2\pi, \ldots$
Range: $y \le -1$ or $y \ge 1$
Period: 2π
(e)
y = cot x
Domain: $x \ne 0, \pm\pi, \pm 2\pi, \ldots$
Range: $-\infty < y < \infty$
Period: π
(f)

Trigonometric Identities

1. $\sin^2\theta+\cos^2\theta=1, 1+\tan^2\theta=\sec^2\theta, 1+\cot^2\theta=\csc^2\theta$

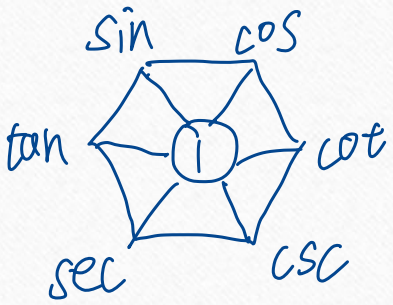
2. Addition Formulas
$$\cos(A+B)=\cos A\cos B-\sin A\sin B$$
$$\sin(A+B)=\sin A\cos B+\cos A\sin B$$

3. Double-Angle Formulas
$$\cos 2\theta=\cos^2\theta-\sin^2\theta$$
$$\sin 2\theta=2\sin\theta\cos\theta$$

4. Half-Angle Formulas
$$\cos^2\theta=\frac{1+\cos 2\theta}{2}$$
$$\sin^2\theta=\frac{1-\cos 2\theta}{2}$$

5. Law of Cosines $c^2=a^2+b^2-2ab\cos C$

6. Special Inequality
$$-|\theta|\le\sin\theta\le|\theta|$$
$$-|\theta|\le 1-\cos\theta\le|\theta|$$



HW1-3

- **No HW**