

Trig Properties

(9/11)

$$\csc X = \frac{1}{\sin X}$$

$$\sec X = \frac{1}{\cos X}$$

$$\cot X = \frac{1}{\tan X}$$

Reciprocal
properties

only defined

when

denom. not 0

Quotient properties

$$\tan x = \frac{\sin x}{\cos x}$$

$$\frac{\sin x}{\cos x} = \frac{\frac{\text{opp}}{\text{hyp}}}{\frac{\text{adj}}{\text{hyp}}}$$

∴ therefore

$$= \frac{\text{opp}}{\cancel{\text{hyp}}} \cdot \frac{\cancel{\text{hyp}}}{\text{adj}}$$

$$= \frac{\text{opp}}{\text{adj}}$$

$$\therefore \tan x = \frac{\sin x}{\cos x} \quad x \neq \frac{\pi}{2} + \pi n$$

another quotient rule $\tan x$

$$\tan x = \frac{\sin x}{\cos x}$$

$$= \frac{1}{\csc x}$$

$$\frac{1}{\sec x}$$

$$= \frac{1}{\csc x} \cdot \frac{\sec x}{1}$$

$$\therefore \tan x = \frac{\sec x}{\csc x} \quad x \neq \frac{\pi}{2} + \pi n$$

Quotient properties

$$\tan x = \frac{\sin x}{\cos x} = \frac{\sec x}{\csc x} \quad x \neq \frac{\pi}{2} + \pi n$$

$$\cot x = \frac{\cos x}{\sin x} = \frac{\csc x}{\sec x} \quad x \neq \pi n$$

Pythagorean properties

$$\cos^2 x + \sin^2 x = 1 \quad \text{for all } x$$

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

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

$$x \neq \frac{\pi}{2} + \pi n$$

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

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

$$x \neq \pi n$$

example : Write all six trig. functions
in terms of $\sin x$

$$\sin x = \sin x$$

$$\cos x = ? = \pm \sqrt{1 - \sin^2 x}$$

$$\cos^2 x + \sin^2 x = 1$$

$$\sqrt{\cos^2 x} = \pm \sqrt{1 - \sin^2 x}$$

$$\cos x = \pm \sqrt{1 - \sin^2 x}$$

$$\tan x = \frac{\sin x}{\cos x}$$

$$\tan x = \frac{\sin x}{\pm \sqrt{1 - \sin^2 x}}$$

$$\cot x = \frac{1}{\tan x} = \frac{\cos x}{\sin x}$$

$$= \frac{\pm \sqrt{1 - \sin^2 x}}{\sin x}$$

$$\csc x = \frac{1}{\sin x}$$

$$\sec X = \frac{1}{\cos X}$$

$$\sec X = \pm \frac{1}{\sqrt{1 - \sin^2 X}}$$

HW:

① study...

② Write all 6
trig functions
in terms of
cosine X