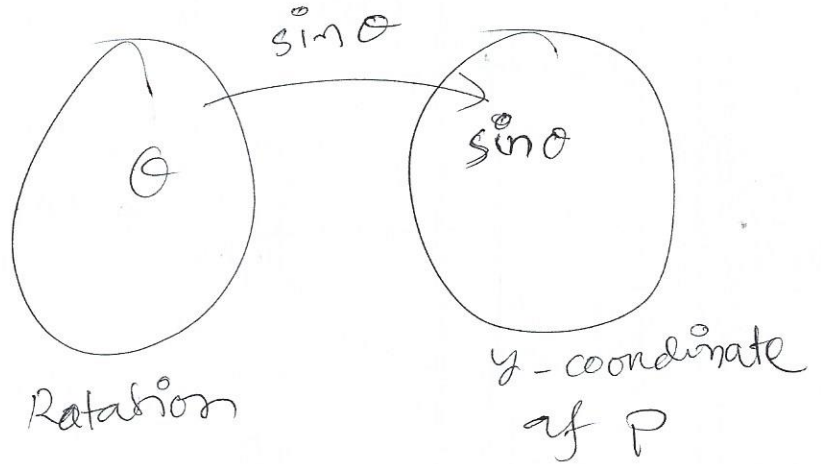
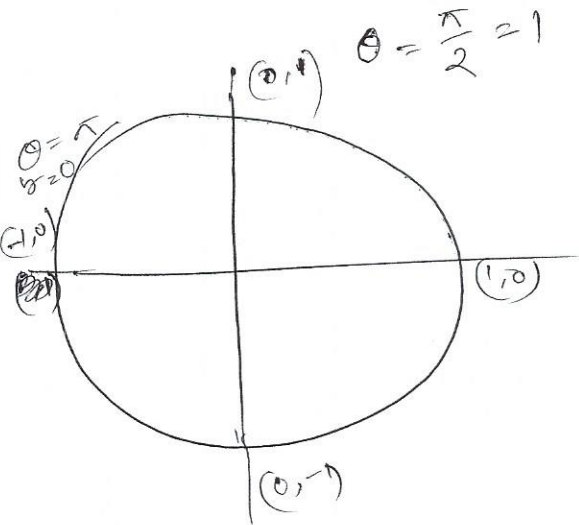


10/05/2018

Range of trig f(x)



$$-1 < \sin \theta \leq 1$$

$$|\sin \theta| \leq 1$$

$$[-1, 1]$$

$$|\cos \theta| \leq 1$$

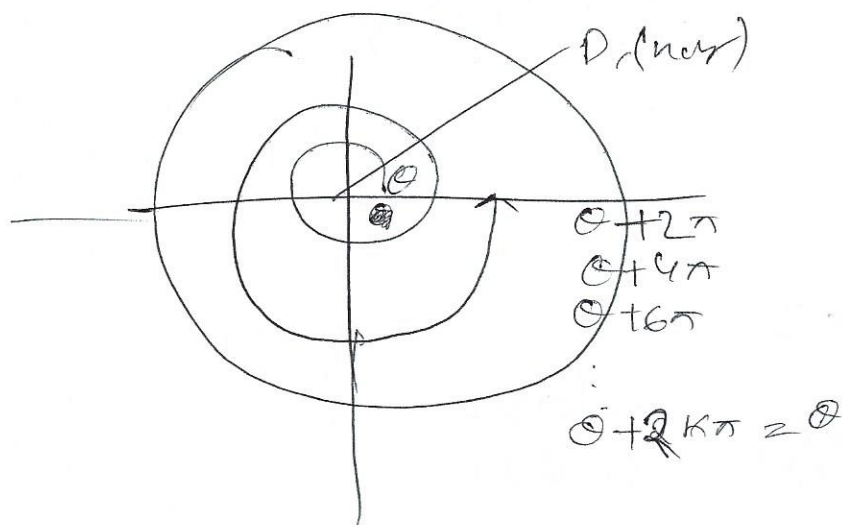
$$[-1, 1]$$

$$|\sin \theta| \leq 1$$

qu

$$\frac{1}{|\sin \theta|} \geq 1$$

$$|\sec \theta| \geq 1$$



$$\sin \theta = \sin(\theta + 2\pi)$$

$$\cos \theta = \cos(\theta + 2\pi)$$

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

$$\cot \theta = \cot(\theta + \pi)$$

Def: A function is periodic if there is a positive number p such that when θ is in domain, $\theta + p$ is also in domain and

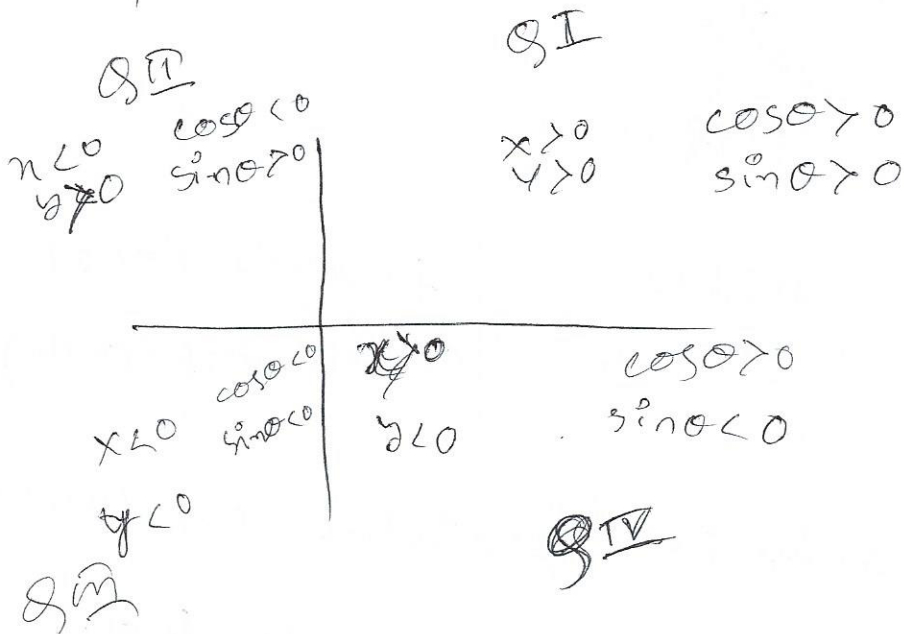
$$f(\theta) = f(\theta + p)$$

If there is a smallest number p it is called (fundamental) period of f .

$$\sin \frac{13\pi}{4} \quad \cos 5\pi$$

$$\frac{17\pi}{4} - 2\pi = \frac{9\pi}{4} - 2\pi = \frac{9\pi}{4} - \frac{8\pi}{4} = \frac{\pi}{4}$$

$$- \frac{17\pi}{4} + 2\pi$$



Fundamental Identities

$$\csc \theta = \frac{1}{\sin \theta} = \frac{1}{y}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{1}{x}$$

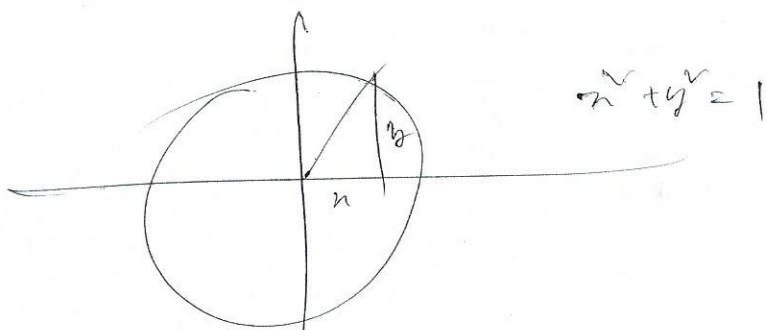
$$\cot \theta = \frac{1}{\tan \theta} = \frac{x}{y}$$

$$\frac{1}{y/x} = \frac{x}{y}$$

Gradient

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

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{x}{y}$$



$$(\cos^2 \theta) + \sin^2 \theta = 1$$

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

$$\cot^2 \theta + 1 = \operatorname{cosec}^2 \theta$$

$$\tan 20^\circ = \frac{\sin 20^\circ}{\cos 20^\circ}$$

$$\tan 20^\circ = \tan 20^\circ \cdot 20$$

$$\sin\left(\frac{\pi}{12}\right) + \frac{1}{\sec\left(\frac{\pi}{12}\right)}$$

$$\sin\left(\frac{\pi}{12}\right) + \cos\left(\frac{\pi}{12}\right) = 1$$

ex: find remaining trig f(n) values.

$$\sin \theta = \frac{1}{3} \quad \cos \theta < 0$$

① circle of radius r

$$\sin \theta = \frac{y}{r} \quad r = 3$$

$$x^2 + y^2 = r^2$$

$$x^2 + 1 = 3^2$$

$$x^2 = 8$$

$$x = -2\sqrt{2}$$

$$\cos \theta = \frac{-2\sqrt{2}}{3}$$

$$\tan \theta = \frac{y}{x} = \frac{\sin \theta}{\cos \theta} = \frac{\frac{1}{3}}{\frac{-2\sqrt{2}}{3}} = \frac{3}{3}$$

$$= -\frac{\sqrt{2}}{4}$$

$$\cot \theta = -\frac{4}{\sqrt{2}} = -2\sqrt{2}$$