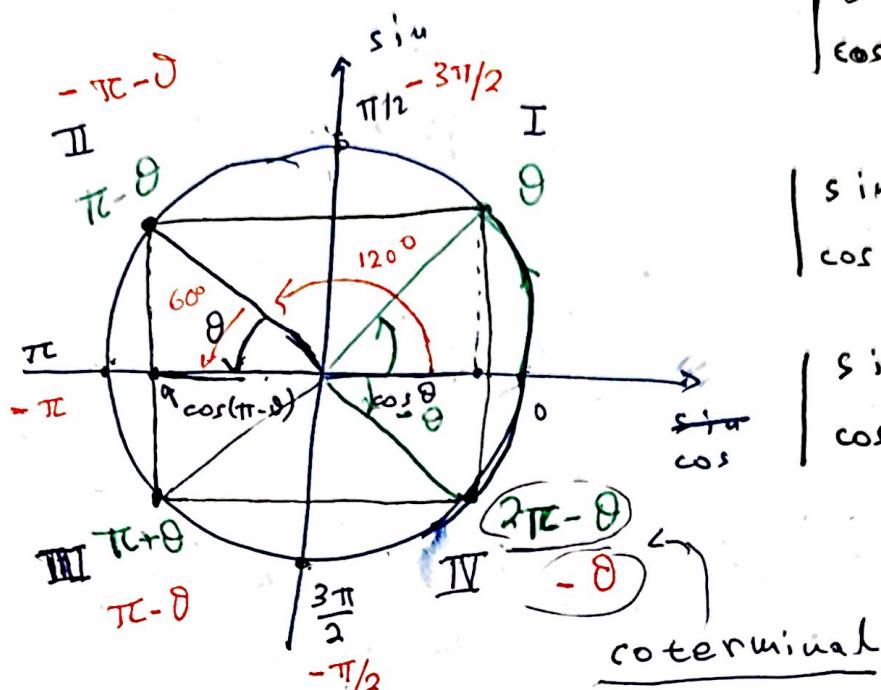


November 13



$$\begin{cases} \sin(\pi - \theta) = \sin \theta \\ \cos(\pi - \theta) = -\cos \theta \end{cases}$$

$$\begin{cases} \sin(\pi + \theta) = -\sin \theta \\ \cos(\pi + \theta) = -\cos \theta \end{cases}$$

$$\begin{cases} \sin(2\pi - \theta) = -\sin \theta \\ \cos(2\pi - \theta) = \cos \theta \end{cases}$$

$$\begin{cases} \sin(-\theta) = -\sin \theta \\ \cos(-\theta) = \cos \theta \end{cases}$$

Ex. Find trig numbers of 120°

Ans. $120^\circ = 180^\circ - 60^\circ$

$$\sin 120^\circ = \sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\cos 120^\circ = -\cos 60^\circ = -\frac{1}{2}$$

$$\sec 120^\circ = \frac{1}{\cos 120^\circ} = -2$$

$$\csc 120^\circ = \frac{1}{\sin 120^\circ} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\tan 120^\circ = \frac{\sin 120^\circ}{\cos 120^\circ} = -\sqrt{3}$$

$$\cot 120^\circ = \frac{1}{\tan 120^\circ} = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$$

Ex. Find trig. numbers of $\frac{7\pi}{6}$

$$210^\circ = 180^\circ + 30^\circ$$

Ans $\frac{7\pi}{6} = \pi + \pi/6$

$$\sin \frac{7\pi}{6} = -\sin \frac{\pi}{6} = -\frac{1}{2}$$

$$\cos \frac{7\pi}{6} = -\cos \frac{\pi}{6} = -\frac{\sqrt{3}}{2}, \text{ etc}$$

(complete the example)

Ex $\cos(315^\circ) = \cos 45^\circ = \frac{\sqrt{2}}{2}$

$$315^\circ = 360^\circ - 45^\circ$$

$$\sin(315^\circ) = -\sin 45^\circ = -\frac{\sqrt{2}}{2}$$

Sine is odd fⁿ

Cosine is even fⁿ

Ex. Find trig numbers of $-\frac{\pi}{3}$ (-60°)

Sol $\sin\left(-\frac{\pi}{3}\right) = -\sin\left(\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

$\cos\left(-\frac{\pi}{3}\right) = \cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

$\sec\left(-\frac{\pi}{3}\right) = 2$ $\csc\left(-\frac{\pi}{3}\right) = -\frac{2}{\sqrt{3}}$

$\tan\left(-\frac{\pi}{3}\right) = -\sqrt{3}$ $\cot\left(-\frac{\pi}{3}\right) = -\frac{1}{\sqrt{3}}$

$\frac{\pi}{3} = 60^\circ$

$\frac{\pi}{6} = 30^\circ$

Example. An angle θ in Quadrant $\textcircled{\text{III}}$ has $\cos\theta = -1/7$. Find the other trig numbers.

Sol. First we find $\sin\theta$.

1st way

$\sin^2\theta + \cos^2\theta = 1 \Leftrightarrow$

$\sin^2\theta + (-1/7)^2 = 1 \Leftrightarrow$

$\Leftrightarrow \sin^2\theta = 1 - \frac{1}{49}$

$\Leftrightarrow \sin\theta = \pm \sqrt{\frac{48}{49}}$
 $= \pm \frac{4\sqrt{3}}{7}$

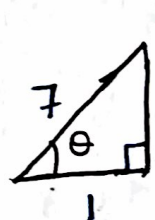
In III sine is negative

$\sin\theta = -4\sqrt{3}/7$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$ e+c ...

2nd way

Build a ~~right~~ triangle with an angle θ s.t. $\cos\theta = \frac{1}{7}$



$\cos = \frac{\text{adj}}{\text{hyp}}$

$x^2 + 1^2 = 7^2$

$\Rightarrow x = \sqrt{48}$
 $= 4\sqrt{3}$

$\sin\theta = -\frac{4\sqrt{3}}{7}$

because III

From triangle $\tan\theta = 4\sqrt{3}$
etc...

↑
Do it...

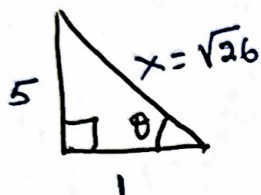
Ex. An angle in IV has ~~$\tan \theta = 5$~~
 $\tan \theta = -5$
 Find rest.

Sol. Make a right triangle with $\tan \theta = 5$
 (positive because IV)

$\tan \theta = \frac{\text{opp}}{\text{adj}}$ $\cos \theta = \frac{1}{\sqrt{26}}$

$x^2 = 1^2 + 5^2$ $\sin \theta = -\frac{5}{\sqrt{26}}$ (negative because IV)
 $= 26$

$x = \sqrt{26}$



etc...

