Inverses of Trig Functions

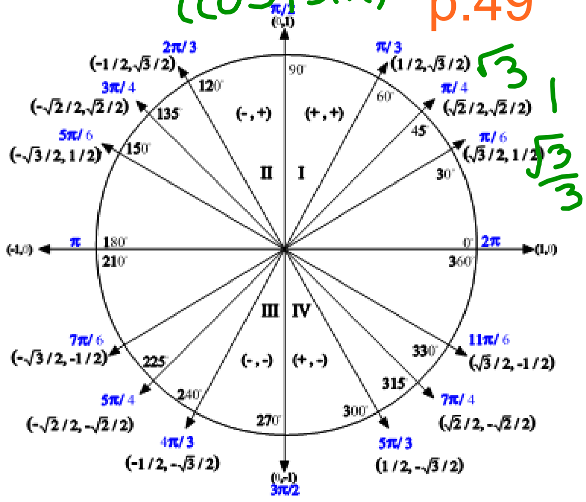
p.49

Review: Find the Exact Value

1. sin 7π/4 = $-\sqrt{2}/2$
2. cos 120° = $-1/2$
3. tan π/3 = $\sqrt{3}$

$$\frac{\sqrt{3}}{2} \div \frac{1}{2} = \frac{\sqrt{3}}{\cancel{2}} \cdot \frac{\cancel{2}}{1} = \sqrt{3}$$

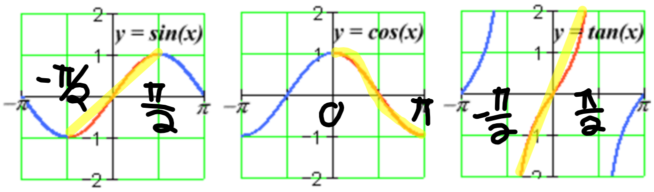
(cos, sin)



- When we find inverses of trig functions, we are "going backwards" to find an angle that has a certain exact value.
- Inverses are notated as $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$ or also arcsin, arccos, arctan
- Say to yourself "I need to find an angle whose _______ is ________"

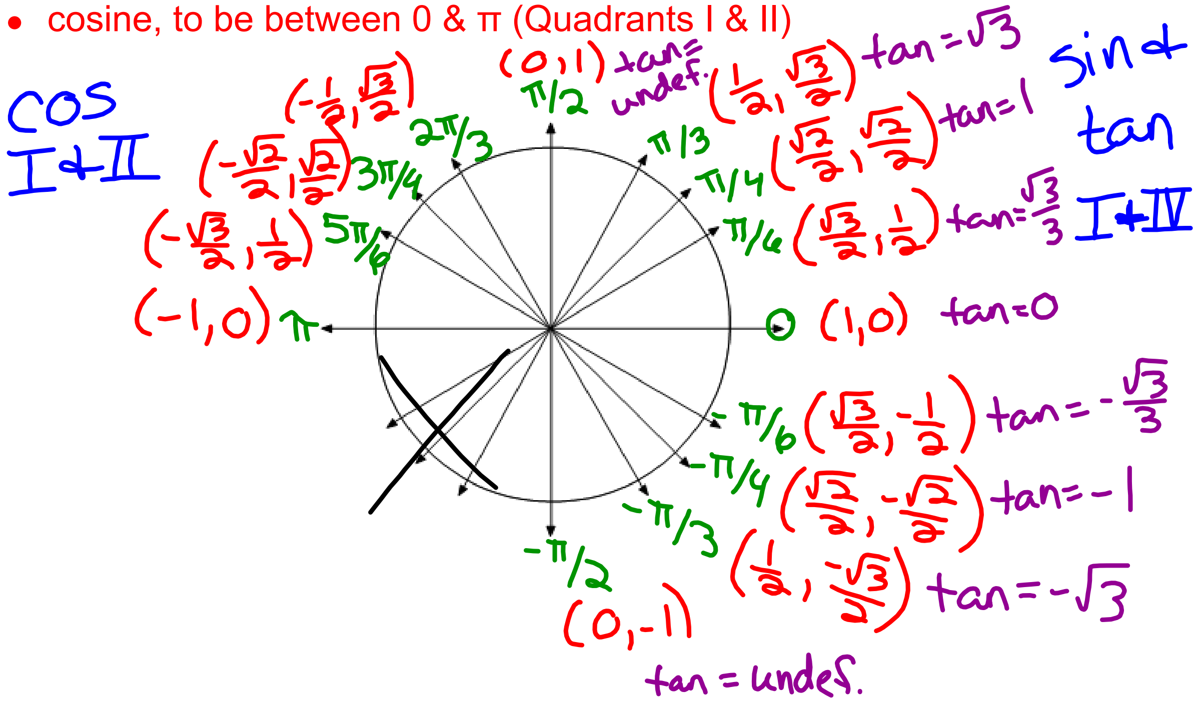
trig fxn value

*Since the inverses of trig functions will no longer be functions, we use the **principal values** (the essential info that can be inverted).



So restrict the domain for...

- sine & tangent, to be between -π/2 & π/2 (Quadrants I & IV)
- cosine, to be between 0 & π (Quadrants I & II)



Evaluate: "I need to find an angle whose sin is $\sqrt{3}/2$"

QI 1. $Sin^{-1}\frac{\sqrt{3}}{2} = \pi/3$

QII 2. $Cos^{-1}(-\frac{\sqrt{3}}{2}) = 5\pi/6$

QI 3. $Tan^{-1}\frac{\sqrt{3}}{3} = \pi/6$

QIV 4. $\text{Arctan}(-1) = -\pi/4$

QIV 5. $\text{Arcsin}\left(-\frac{\sqrt{2}}{2}\right) = -\pi/4$

6. $\cos(Sin^{-1} -\frac{\sqrt{3}}{2}) = \cos(-\pi/3) = \frac{1}{2}$

inside 1st

7. $\text{Arccos}\left(\sin\left(\frac{5\pi}{6}\right)\right) = \text{arccos}\left(\frac{1}{2}\right) = \frac{\pi}{3}$

8. $Cos^{-1}(\cos(4)) = 4$ bc inverses cancel

9. $\cos(\tan^{-1}\frac{\sqrt{3}}{3}) + \sin(\cos^{-1} 0)$

$\cos(\pi/6) + \sin(\pi/2)$

$\frac{\sqrt{3}}{2} + 1 = \frac{\sqrt{3}}{2} + \frac{2}{2} = \frac{\sqrt{3}+2}{2}$

sin cos

$\frac{1}{2} \div \frac{\sqrt{3}}{2}$

$\frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

x y

(cos, sin)