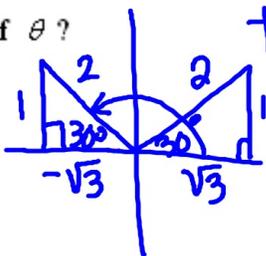


If  $\sin \theta = \frac{1}{2}$ , what is the value of  $\theta$ ?

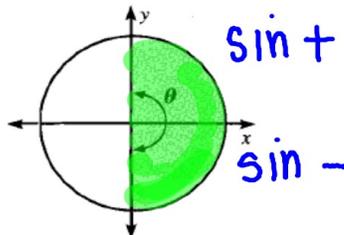
$\theta = 150^\circ, \boxed{30^\circ}$   
 $510^\circ, 390^\circ$   
 $-330^\circ$



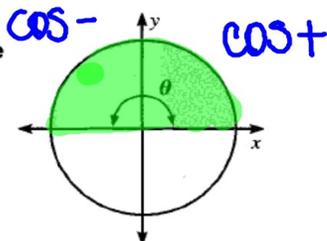
sin + | all +  
 tan + | cost

**INVERSE TRIGONOMETRIC FUNCTIONS**

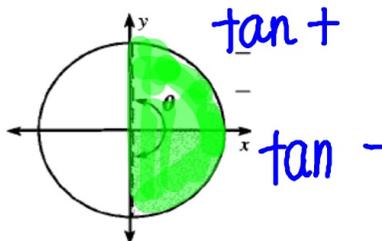
- If  $-1 \leq a \leq 1$ , then the **inverse sine** of  $a$  is  $\sin^{-1} a = \theta$  where  $\sin \theta = a$  and  $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$  (or  $-90^\circ \leq \theta \leq 90^\circ$ ).



- If  $-1 \leq a \leq 1$ , then the **inverse cosine** of  $a$  is  $\cos^{-1} a = \theta$  where  $\cos \theta = a$  and  $0 \leq \theta \leq \pi$  (or  $0^\circ \leq \theta \leq 180^\circ$ ).



- If  $a$  is any real number, then the **inverse tangent** of  $a$  is  $\tan^{-1} a = \theta$  where  $\tan \theta = a$  and  $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$  (or  $-90^\circ < \theta < 90^\circ$ ).



**Definitions of Inverse Functions** (textbook reference page 792)

Inverse Sine  $\sin^{-1} a = \theta$ , if  $\sin \theta = a$  and  $-90^\circ \leq \theta \leq 90^\circ$   $\left(-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}\right)$

Inverse Cosine  $\cos^{-1} a = \theta$ , if  $\cos \theta = a$  and  $0^\circ \leq \theta \leq 180^\circ$   $(0 \leq \theta \leq \pi)$

Inverse Tangent  $\tan^{-1} a = \theta$ , if  $\tan \theta = a$  and  $-90^\circ < \theta < 90^\circ$   $\left(-\frac{\pi}{2} < \theta < \frac{\pi}{2}\right)$

\*Inverse Cotangent  $\cot^{-1} a = \theta$ , if  $\cot \theta = a$  and  $0^\circ < \theta < 180^\circ$   $(0 < \theta < \pi)$   
 (\*not in textbook)

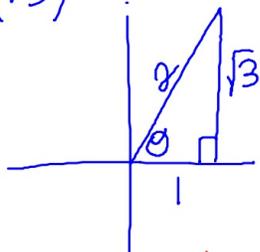
Q4, Q1  
 Q1, Q2  
 Q4, Q1  
 Q1, Q2

Summary:

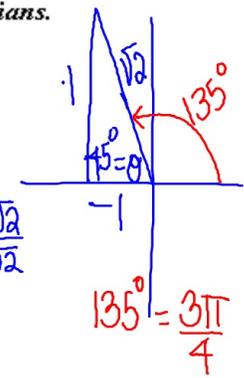
	+	-
$\sin^{-1}$	Q1	Q4 (-∠)
$\cos^{-1}$	Q1	Q2 (obtuse ∠)
$\tan^{-1}$	Q1	Q4 (-∠)
$\cot^{-1}$	Q1	Q2 (obtuse)

Evaluate without a calculator. Give angle measures in degrees and radians.

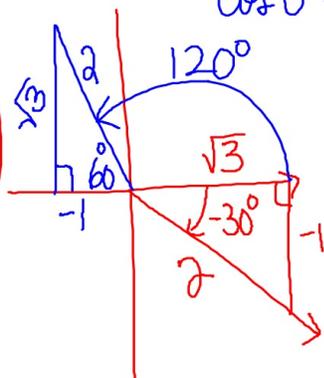
1.  $\tan^{-1}(\sqrt{3})$   
 $\tan \theta = \frac{\sqrt{3}}{1}$   
 $= 60^\circ$   
 $= \frac{\pi}{3}$



2.  $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$   
 $\cos \theta = \frac{-\sqrt{2} : \sqrt{2}}{2 : \sqrt{2}}$   
 $\cos \theta = \frac{-1}{\sqrt{2}}$



3.  $\cot^{-1}\left(\frac{\tan\left(\frac{\pi}{6}\right)}{\tan(-30^\circ)}\right)$   
 $= \cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$

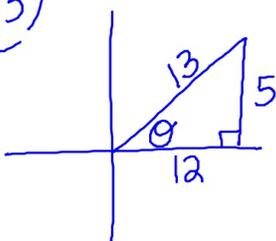


$120^\circ = \frac{2\pi}{3}$

Evaluate without a calculator. Give answers in simplest form.

4.

$$\sec\left(\sin^{-1}\frac{5}{13}\right) \quad \sin\theta = \frac{5}{13}$$

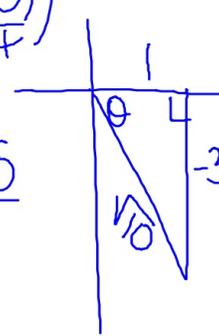
$$= \sec\theta$$


$$\frac{13}{12}$$

5.

$$\sin\left(\tan^{-1}\left(-\frac{3}{4}\right)\right)$$

$$= \sin\theta$$

$$= \frac{-3}{\sqrt{10}} = \frac{-3\sqrt{10}}{10}$$


Definitions of Inverse Functions (not in our textbook)

Inverse Cosecant  $\csc^{-1} a = \sin^{-1}\left(\frac{1}{a}\right)$ , if  $a \neq 0$

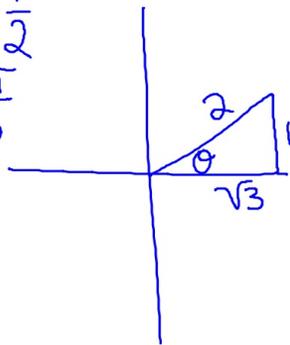
Inverse Secant  $\sec^{-1} a = \cos^{-1}\left(\frac{1}{a}\right)$ , if  $a \neq 0$

Evaluate without a calculator.

6.  $\csc^{-1}(2) = \sin^{-1}\left(\frac{1}{2}\right)$

$$\sin\theta = \frac{1}{2}$$

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



7.  $\cot\left(\sec^{-1}(-3)\right) \quad \cos\theta = -\frac{1}{3}$

$$= \cot\left(\cos^{-1}\left(-\frac{1}{3}\right)\right)$$

$$\cot\theta$$

$$= \frac{-1 \cdot \sqrt{2}}{2\sqrt{2} \cdot \sqrt{2}} = \frac{-\sqrt{2}}{4}$$

