

S.6 Inverse properties

$$\sin(\arcsin x) = x$$

$$-1 \leq x \leq 1$$

$$\arcsin(\sin y) = y$$

$$-\frac{\pi}{2} \leq y \leq \frac{\pi}{2} \quad \text{QIV} \text{ \& } \text{QI}$$

$$\cos(\arccos x) = x$$

$$-1 \leq x \leq 1$$

$$\arccos(\cos y) = y$$

$$0 \leq y \leq \pi \quad \text{QI} \text{ \& } \text{QII}$$

$$\tan(\arctan x) = x$$

$$-\infty < x < \infty$$

$$\text{QIV, QI}$$

$$\arctan(\tan y) = y \quad -\frac{\pi}{2} < y < \frac{\pi}{2}$$

If possible find the exact value.

a. $\tan(\arctan(-5)) = \boxed{-5}$

b. $\arcsin(\sin \frac{5\pi}{3}) = \frac{5\pi}{3}$
 $\arcsin(\sin(-\frac{\pi}{3})) = \boxed{-\frac{\pi}{3}}$

c. $\cos(\cos^{-1} \pi) = \boxed{\text{DNE}}$

$$\sin \frac{5\pi}{3} = \sin \left(\frac{5\pi}{3} - 2\pi \right)$$

$$\frac{5\pi}{3} - 2\pi = -\frac{\pi}{3}$$

p463

Use 5.6 #65

The properties of Inverse functions to find the exact value of the expression.

$$\sin(\arctan \frac{4}{3}) = \sin(\theta) = ? \quad \boxed{\frac{4}{5}} \checkmark$$

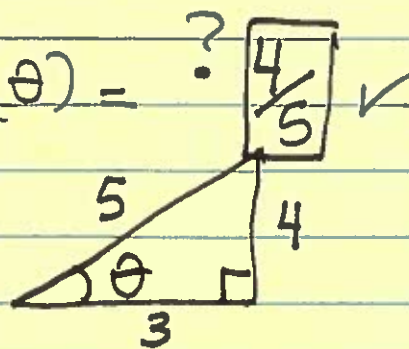
I am an Angle

$\theta = \arctan \frac{4}{3}$
 Q.IV or Q.I

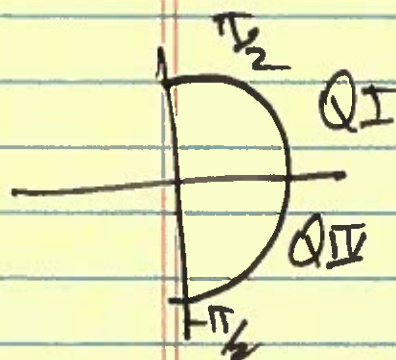
$\tan \theta = \frac{4}{3}$

θ is in Q.I or Q.III

θ is in Q.I



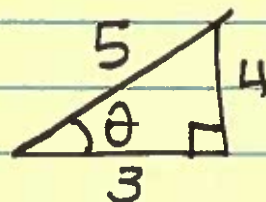
(66) $\sec(\arcsin \frac{4}{5}) = \sec(\theta) = \boxed{\frac{5}{3}}$



$\downarrow -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$
 $\theta = \arcsin \frac{4}{5}$

\downarrow QIV or QI

$\sin \theta = \frac{4}{5}$

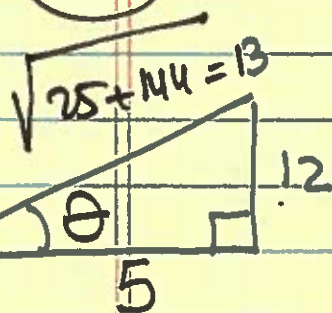


$0 \leq \theta \leq \pi$

θ in QI or QII



(68) $\csc[\arctan(-\frac{12}{5})] = \csc(\theta) = \boxed{-\frac{13}{12}}$



θ in QIV or QI
 $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$

θ in QIV

$\theta = \arctan(-\frac{12}{5})$

$\tan \theta = -\frac{12}{5}$

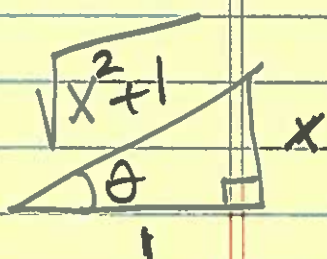
QII or QIV

$$(72) \quad \cot \left(\arctan \frac{5}{8} \right) = \frac{8}{5}$$

$$\frac{1}{\tan \left(\arctan \frac{5}{8} \right)} = \frac{1}{\frac{5}{8}} = \boxed{\frac{8}{5}} \checkmark$$

$$(73) \quad \cot (\arctan x) = \frac{1}{x} ; \underline{x \neq 0}$$

$$(74) \quad \sin (\arctan x) = \sin (\theta) = \frac{x}{\sqrt{x^2+1}}$$

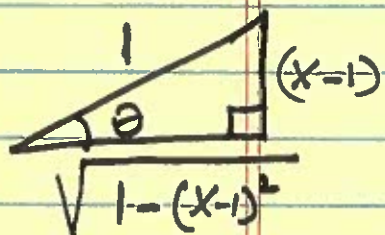


$$\theta = \arctan x$$

$$\tan \theta = \frac{x}{1} \quad \boxed{0 < x < 2} \checkmark$$

$$(76) \quad \sec (\arcsin (x-1)) = \sec \theta = \frac{1}{\sqrt{1-(x-1)^2}}$$

$$\theta = \arcsin (x-1)$$



$$\sin \theta = (x-1)$$

$$\leftarrow \begin{matrix} - & + & - \\ 0 & 1 & 2 \end{matrix} \rightarrow$$

$$1 - (x-1)^2 = \cancel{1} - x^2 + 2x - \cancel{1} \quad \sqrt{2x-x^2} \quad \begin{matrix} 2x-x^2 > 0 \\ x(2-x) > 0 \end{matrix}$$

(80)

$$\cos \left(\arcsin \frac{x-h}{r} \right) = \boxed{\cos \theta = \frac{\sqrt{r^2 - (x-h)^2}}{r}}$$



$$\theta = \arcsin \left(\frac{x-h}{r} \right)$$

$$\sin \theta = \frac{x-h}{r}$$

