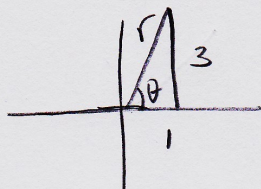


8.2 Inverse Trig Functions Cont'd

P.1

Ex: Find $\sin(\tan^{-1} 3)$

$$\text{Let } \theta = \tan^{-1} 3$$



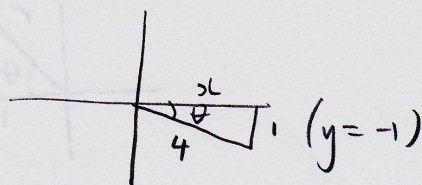
$$\begin{aligned} 1^2 + 3^2 &= r^2 \\ 10 &= r^2 \\ r &= \pm \sqrt{10} \\ r &= \sqrt{10} \end{aligned}$$

$$\begin{aligned} \sin \theta &= \frac{y}{r} \\ &= \frac{3}{\sqrt{10}} \\ &= \frac{3\sqrt{10}}{10} \end{aligned}$$

Ex: Find $\cos(\sin^{-1}(-\frac{1}{4}))$

$$\text{Let } \theta = \sin^{-1}(-\frac{1}{4})$$

$$\begin{aligned} x^2 + 1^2 &= 4^2 \\ x^2 &= 15 \\ x &= \pm \sqrt{15} \\ x &= \sqrt{15} \end{aligned}$$



$$\cos \theta = \frac{x}{r}$$

$$= \frac{\sqrt{15}}{4}$$

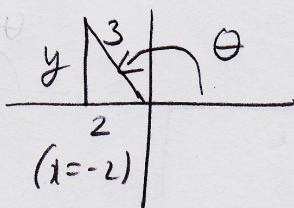
p. 2

Ex: Find $\tan(\cos^{-1}(-\frac{2}{3}))$

$$\text{Let } \theta = \cos^{-1}(-\frac{2}{3})$$

$$\cos \theta = \frac{-2}{3} = \frac{x}{r}$$

$$x = -2 \quad r = 3$$

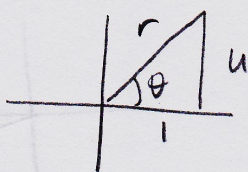


$$\begin{aligned} 2^2 + y^2 &= 3^2 \\ y^2 &= 5 \\ y &= \pm \sqrt{5} \\ y &= \sqrt{5} \end{aligned}$$

$$\tan \theta = \frac{y}{x} = \frac{\sqrt{5}}{-2} = -\frac{\sqrt{5}}{2}$$

Ex: Find $\sin(\tan^{-1} u)$

$$\text{Let } \theta = \tan^{-1} u$$



$$\begin{aligned} 1^2 + u^2 &= r^2 \\ r &= \pm \sqrt{1+u^2} \\ r &= \sqrt{1+u^2} \end{aligned}$$

$$\sin \theta = \frac{y}{r} = \frac{u}{\sqrt{1+u^2}}$$

Note: If θ is in QIV, calculation is still correct
 e.g. $\sin(\tan^{-1} -1) = \sin\left(-\frac{\pi}{4}\right) = -\frac{1}{\sqrt{2}}$ —

Ex: Find the exact value of $\csc^{-1}(-\sqrt{2})$

$$\text{Let } \theta = \csc^{-1}(-\sqrt{2})$$

$$\csc \theta = -\sqrt{2}$$

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

$$\theta = \sin^{-1}\left(-\frac{1}{\sqrt{2}}\right) = -\frac{\pi}{4}$$

Ex: Round $\cot^{-1}\left(\frac{4}{5}\right)$ to 2 decimal places.

$$\text{Let } \theta = \cot^{-1}\left(\frac{4}{5}\right)$$

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

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

$$\theta = \tan^{-1}\left(\frac{5}{4}\right) \approx 0.90 \text{ radians}$$