

## ***Solution***

## ***Section 2.7 - Inverse Trigonometry Functions***

### ***Exercise***

Evaluate without using a calculator:  $\cos\left(\cos^{-1}\frac{3}{5}\right)$

### **Solution**

$$\cos\left(\cos^{-1}\frac{3}{5}\right) = \frac{3}{5}$$

### ***Exercise***

Evaluate without using a calculator:  $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$

### **Solution**

$$\cos^{-1}\left(\cos\frac{7\pi}{6}\right) = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = \frac{5\pi}{6}$$

### ***Exercise***

Evaluate without using a calculator:  $\tan\left(\cos^{-1}\frac{3}{5}\right)$

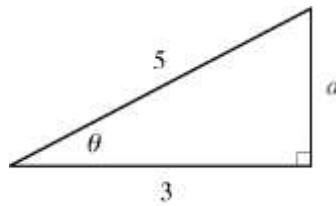
### **Solution**

$$\tan\left(\cos^{-1}\frac{3}{5}\right)$$

$$5^2 = 3^2 + a^2 \rightarrow a = 4$$

$$\tan\left(\cos^{-1}\frac{3}{5}\right) = \tan\theta$$

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



**Exercise**

Evaluate without using a calculator:  $\sin\left(\cos^{-1} \frac{1}{\sqrt{5}}\right)$

**Solution**

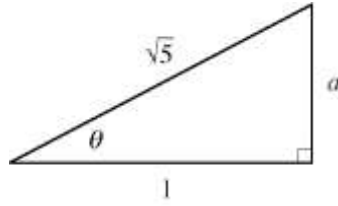
$$\sin\left(\cos^{-1} \frac{1}{\sqrt{5}}\right)$$

$$(\sqrt{5})^2 = 1^2 + a^2$$

$$\rightarrow a^2 = 5 - 1$$

$$\rightarrow a = 2$$

$$\begin{aligned}\sin\left(\cos^{-1} \frac{1}{\sqrt{5}}\right) &= \sin \theta \\ &= \frac{2}{\sqrt{5}}\end{aligned}$$

**Exercise**

Evaluate without using a calculator:  $\cos\left(\sin^{-1} \frac{1}{2}\right)$

**Solution**

$$\cos\left(\sin^{-1} \frac{1}{2}\right)$$

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

$$\begin{aligned}\cos\left(\sin^{-1} \frac{1}{2}\right) &= \cos \frac{\pi}{6} \\ &= \frac{\sqrt{3}}{2}\end{aligned}$$

**Exercise**

Evaluate without using a calculator:  $\sin\left(\sin^{-1} \frac{3}{5}\right)$

**Solution**

$$\sin\left(\sin^{-1} \frac{3}{5}\right) = \frac{3}{5}$$

### Exercise

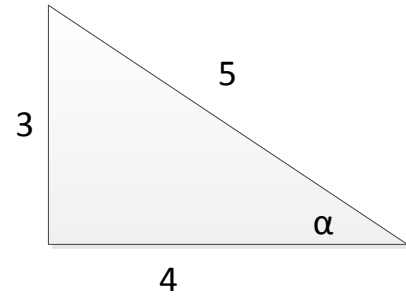
Evaluate without using a calculator:  $\cos\left(\tan^{-1}\frac{3}{4}\right)$

#### Solution

$$\alpha = \tan^{-1}\frac{3}{4} \Rightarrow \tan \alpha = \frac{3}{4}$$

$$r = \sqrt{3^2 + 4^2} = 5$$

$$\Rightarrow \boxed{\cos \alpha = \frac{4}{5}}$$



### Exercise

Evaluate without using a calculator:  $\tan\left(\sin^{-1}\frac{3}{5}\right)$

#### Solution

$$\sin \alpha = \frac{3}{5}$$

$$\boxed{\tan\left(\sin^{-1}\frac{3}{5}\right) = \frac{3}{4}}$$

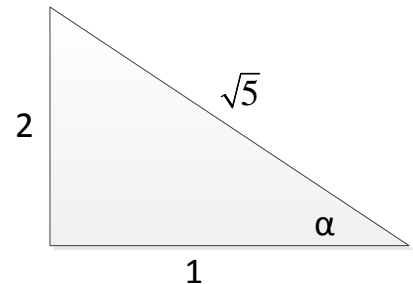
### Exercise

Evaluate without using a calculator:  $\sec\left(\cos^{-1}\frac{1}{\sqrt{5}}\right)$

#### Solution

$$\alpha = \cos^{-1}\frac{1}{\sqrt{5}} \rightarrow \cos \alpha = \frac{1}{\sqrt{5}}$$

$$\boxed{\sec \alpha = \frac{1}{\cos \alpha} = \frac{1}{\frac{1}{\sqrt{5}}} = \sqrt{5}}$$



### Exercise

Evaluate without using a calculator:  $\cot\left(\tan^{-1}\frac{1}{2}\right)$

#### Solution

$$\alpha = \tan^{-1}\frac{1}{2} \Rightarrow \tan \alpha = \frac{1}{2}$$

$$\boxed{\cot \alpha = \frac{1}{\tan \alpha} = 2}$$

### Exercise

Write an equivalent expression that involves  $x$  only for  $\cos(\cos^{-1} x)$

### Solution

$$\alpha = \cos^{-1} x \Rightarrow \cos \alpha = x$$

$$\boxed{\cos(\cos^{-1} x) = \cos \alpha = x}$$

### Exercise

Write an equivalent expression that involves  $x$  only for  $\tan(\cos^{-1} x)$

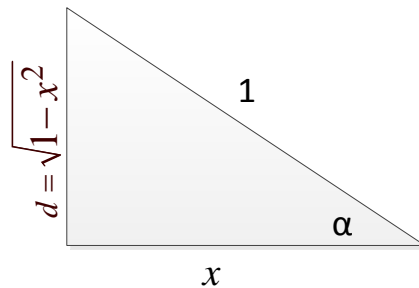
### Solution

$$\alpha = \cos^{-1} x \Rightarrow \cos \alpha = x = \frac{x}{1}$$

$$x^2 + d^2 = 1 \Rightarrow d^2 = 1 - x^2$$

$$d = \sqrt{1 - x^2}$$

$$\boxed{\tan(\cos^{-1} x) = \tan \alpha = \frac{\sqrt{1 - x^2}}{x}}$$



### Exercise

Write an equivalent expression that involves  $x$  only for  $\csc(\sin^{-1} \frac{1}{x})$

### Solution

$$\alpha = \sin^{-1} \frac{1}{x} \Rightarrow \sin \alpha = \frac{1}{x}$$

$$\boxed{\csc(\sin^{-1} \frac{1}{x}) = \csc \alpha = \frac{1}{\sin \alpha} = x}$$