

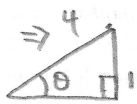
Problem A (HW 7)

$$\cos\left(\sin^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(-\frac{1}{7}\right)\right)$$

$$= \underbrace{\cos\left(\sin^{-1}\left(\frac{1}{4}\right)\right)}_{\substack{= \frac{\sqrt{15}}{4} \\ \text{let } \theta = \sin^{-1}\left(\frac{1}{4}\right) \rightarrow \text{QI, QIV} \\ \downarrow \\ \sin\theta = \frac{1}{4} \rightarrow \text{QI, QII} \\ \Rightarrow \begin{array}{c} 4 \\ \text{right triangle with } \theta \\ \text{opposite side } 1 \\ \text{hypotenuse } 4 \\ \text{adjacent side } ? \\ ?^2 + 1^2 = 4^2 \\ ? = \sqrt{15} \end{array}} \cos\left(\tan^{-1}\left(-\frac{1}{7}\right)\right) - \underbrace{\sin\left(\sin^{-1}\left(\frac{1}{4}\right)\right)}_{\frac{1}{4}} \underbrace{\sin\left(\tan^{-1}\left(-\frac{1}{7}\right)\right)}_{\substack{= -\frac{1}{\sqrt{50}} \\ \theta = \tan^{-1}\left(-\frac{1}{7}\right) \rightarrow \theta \text{ in QII, QIV} \\ \tan(\theta) = -\frac{1}{7} \rightarrow \theta \text{ in QII, QIV} \\ \begin{array}{c} ? \\ \text{right triangle with } \theta \\ \text{adjacent side } 7 \\ \text{opposite side } 1 \\ \text{hypotenuse } ? \\ 1^2 + 7^2 = ?^2 \\ ? = \sqrt{50} \end{array}}\end{array}$$

let $\theta = \sin^{-1}\left(\frac{1}{4}\right) \rightarrow \text{QI, QIV}$

$$\sin\theta = \frac{1}{4} \rightarrow \text{QI, QII}$$



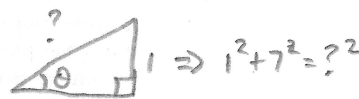
$$?^2 + 1^2 = 4^2$$

$$? = \sqrt{15}$$

$$\Rightarrow \cos\left(\sin^{-1}\left(\frac{1}{4}\right)\right) = \cos(\theta) = \frac{\sqrt{15}}{4}$$

$\theta = \tan^{-1}\left(-\frac{1}{7}\right) \rightarrow \theta \text{ in QII, QIV}$

$\tan(\theta) = -\frac{1}{7} \rightarrow \theta \text{ in QII, QIV}$



$$1^2 + 7^2 = ?^2$$

$$\Rightarrow ? = \sqrt{50}$$

Therefore,

$$\cos\left(\tan^{-1}\left(-\frac{1}{7}\right)\right) = \cos(\theta) = \frac{7}{\sqrt{50}}$$

and

$$\sin\left(\tan^{-1}\left(-\frac{1}{7}\right)\right) = \sin(\theta) = -\frac{1}{\sqrt{50}}$$

Thus,

$$\cos\left(\sin^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(-\frac{1}{7}\right)\right) = \frac{\sqrt{15}}{4} \cdot \frac{7}{\sqrt{50}} - \left(-\frac{1}{4}\right) \left(-\frac{1}{\sqrt{50}}\right)$$