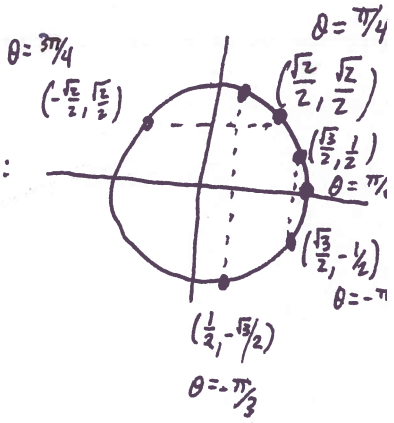
HW5 §8.3




#8] $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \pi/4$ because of unit circle:

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

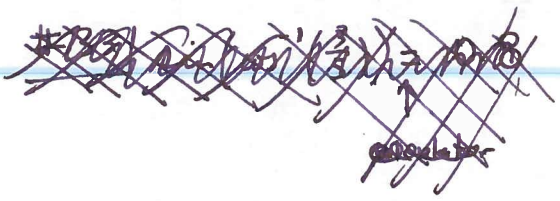
#11] $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) = \frac{3\pi}{4}$

#13] $\tan^{-1}\left(-\sqrt{3}\right) = -\frac{\pi}{3}$

#18] $\arcsin(0.23) \approx 0.232\ldots$

#25] $\sin^{-1}\left(\underbrace{\cos\left(-\frac{\pi}{2}\right)}_{=0}\right) = \sin^{-1}(0) = 0$

#26] $\cos^{-1}\left(\underbrace{\sin\left(\frac{\pi}{3}\right)}_{=\frac{\sqrt{3}}{2}}\right) = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{6}$



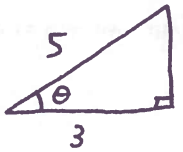
#33] $\sin\left(\cos^{-1}\left(\frac{3}{5}\right)\right)$

Soln: Let $\theta = \cos^{-1}\left(\frac{3}{5}\right) \longrightarrow \theta$ lives in QI or QII

$\Downarrow$

$\cos(\theta) = \frac{3}{5} \longrightarrow \theta$ lives in QI or QIV

$\Big\}$ $\theta$ lives in QI




$\Rightarrow 3^2 + ?^2 = 5^2$

$\Rightarrow ? = \sqrt{25-9} = \sqrt{16} = 4$

Therefore

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

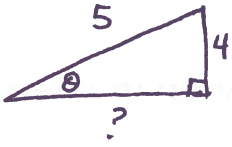
#32] $\cos\left(\sin^{-1}\left(\frac{4}{5}\right)\right)$

Soln: Let $\theta = \sin^{-1}\left(\frac{4}{5}\right)$ $\longrightarrow$ $\theta$ lives in QI or QII

$\Downarrow$

$\sin(\theta) = \frac{4}{5}$ $\longrightarrow$ $\theta$ lives in QI or QII

$\Rightarrow \theta$ lives in QI




$\Rightarrow \quad ?^2 + 4^2 = 5^2$

$\Rightarrow \quad ? = \sqrt{25-16} = \sqrt{9} = 3$

Therefore, $\cos\left(\sin^{-1}\left(\frac{4}{5}\right)\right) = \cos(\theta) = \frac{3}{5}$

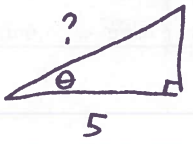
#35] $\cos\left(\tan^{-1}\left(\frac{12}{5}\right)\right)$

Soln: Let $\theta = \tan^{-1}\left(\frac{12}{5}\right)$ $\Rightarrow$ $\theta$ lives in QI or QIII

$\Downarrow$

$\tan(\theta) = \frac{12}{5}$ $\Rightarrow$ $\theta$ lives in QI or QIII

$\Rightarrow \theta$ lives in QI

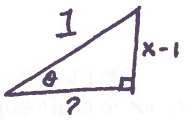



$\Rightarrow \quad 5^2 + 12^2 = ?^2 \quad \Rightarrow \quad ? = \sqrt{25+144} = \sqrt{169} = 13$

Therefore, $\cos\left(\tan^{-1}\left(\frac{12}{5}\right)\right) = \cos(\theta) = \frac{5}{13}$

#37] $\tan\left(\sin^{-1}(x-1)\right)$

Soln: Let $\theta = \sin^{-1}(x-1)$. Then $\sin(\theta) = x-1$:




$\Rightarrow \quad ?^2 + (x-1)^2 = 1^2$

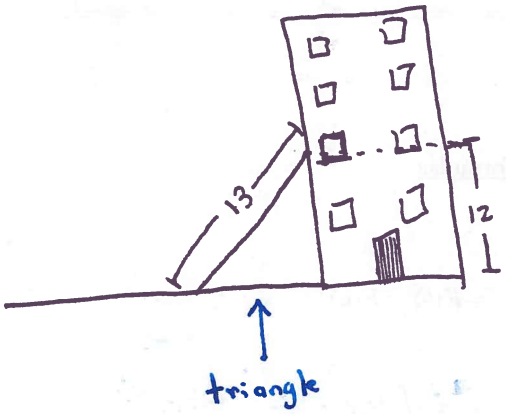
$? = \sqrt{1-(x-1)^2}$

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

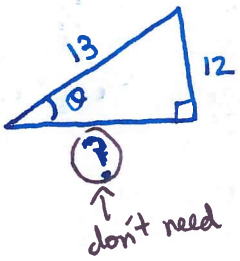
$= \sqrt{2x-x^2}$

Then, $\tan\left(\sin^{-1}(x-1)\right) = \tan(\theta) = \frac{x-1}{\sqrt{2x-x^2}}$

53]




triangle




don't need

$\Rightarrow \sin(\theta) = \frac{12}{13}$

$\Rightarrow$ Take $\sin^{-1}$ of both sides to get

$\cancel{\sin^{-1}}\left(\cancel{\sin}(\theta)\right) = \sin^{-1}\left(\frac{12}{13}\right)$

inverse functions cancel: ~~$f^{-1}(f(x)) = x$~~

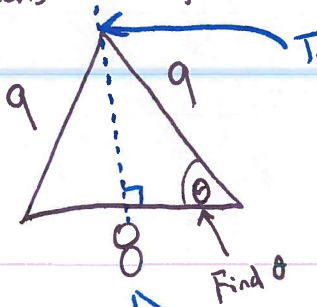
~~$\sin^{-1}\sin$~~

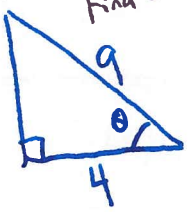
$\theta = \sin^{-1}\left(\frac{12}{13}\right)$

Calculator $\approx 1.176$ radians

55] "isoceles" means two of sides are same length

TRICK: Cut in half




$\Rightarrow \cos\theta = \frac{4}{9}$

$\theta = \cos^{-1}\left(\frac{4}{9}\right)$

$\approx 1.1102$ rad

$\approx 63.61^\circ$

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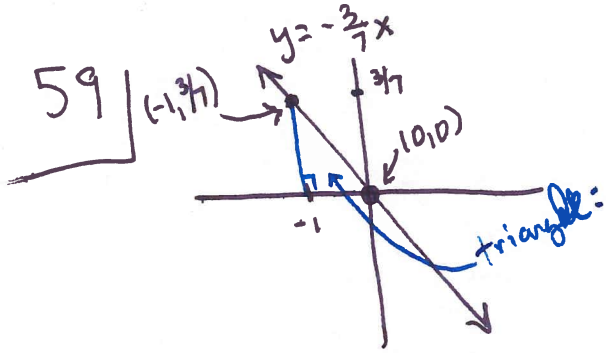


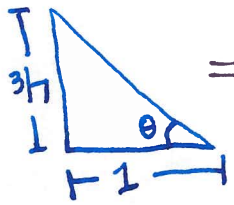


$\Rightarrow \tan(\theta) = \frac{3/7}{1} = \frac{3}{7}$

$\Rightarrow \theta = \tan^{-1}\left(\frac{3}{7}\right) \approx 0.4048$ rad

$\approx 23.2^\circ$