7.4 3, 5, 19, 20, 31, 32, 43, 44, 50, 51, 54

3. a) $\sin^{-1}\frac{\sqrt{2}}{2} = \frac{\pi}{4}$ since $\sin\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

b) $\cos^{-1}\frac{\sqrt{2}}{2} = \frac{\pi}{4}$ since $\cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

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

These problems are a matter of guessing the correct value. No calculations are involved

5. a) $\sin^{-1} 1 = \frac{\pi}{2}$

b) $\cos^{-1} 1 = 0$

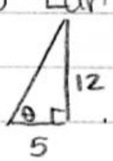
c) $\cos^{-1}(-1) = \pi$

19. $\sin^{-1}\left[\sin\left(-\frac{\pi}{6}\right)\right] = -\frac{\pi}{6}$ because $-\frac{\pi}{6} \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (see p. 561)

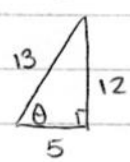
20. $\sin^{-1}\left[\sin\left(\frac{5\pi}{6}\right)\right] = \sin^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{6}$

31. $\sin\left(\tan^{-1}\frac{12}{5}\right)$

If $\theta = \tan^{-1}\frac{12}{5}$, then $\tan\theta = \frac{12}{5}$ so we can draw the triangle



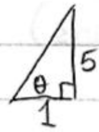
By the Pythagorean Theorem we know the hypoteneuse.



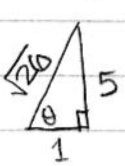
Thus $\sin\left(\tan^{-1}\frac{12}{5}\right) = \sin\theta = \frac{12}{13}$.

32. $\cos\left(\tan^{-1} 5\right)$

Let $\theta = \tan^{-1} 5$ so we get the triangle

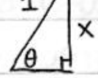


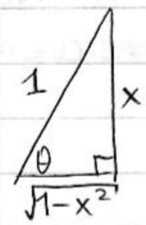
(interpret 5 as $\frac{5}{1}$). Filling in the hypoteneuse:



Thus $\cos\left(\tan^{-1} 5\right) = \cos\theta = \frac{1}{\sqrt{26}} = \frac{\sqrt{26}}{26}$.

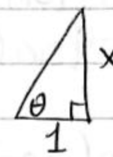
43 $\tan(\sin^{-1}x)$

Let $\theta = \sin^{-1}x$. Then $\sin\theta = x$. Drawing the triangle (interpreting x as $\frac{x}{1}$) gets us  and using the Pyth. theorem gets us the remaining side:

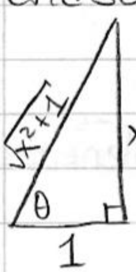


Thus $\tan(\sin^{-1}x) = \tan\theta = \frac{x}{\sqrt{1-x^2}}$

44. $\cos(\tan^{-1}x)$.

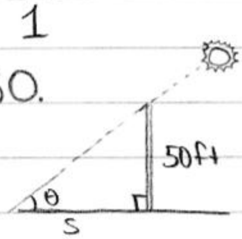
Let $\theta = \tan^{-1}x$, so $\tan\theta = x = \frac{x}{1}$. This gets the triangle 

and so by Pyth. theorem we get fill in the hypoteneuse



Hence $\cos(\tan^{-1}x) = \cos\theta = \frac{1}{\sqrt{x^2+1}}$.

50.



a) Express θ as a function of s.

We know that $\tan\theta = \frac{50}{s}$, so

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

b) Find θ when $s = 20$

$\theta = \tan^{-1}\left(\frac{50}{20}\right) = 68.2^\circ$ (1.19 radians)