HW #15 Solution
Math 143

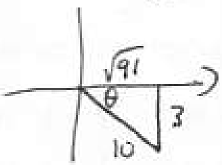
(3) (a) $\arcsin\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{3}$ (b) $\arccos\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$ (c) $\arctan\left(\frac{\sqrt{3}}{3}\right) = \frac{\pi}{6}$

(7) (a) $\sin\left(\arcsin\left(-\frac{3}{10}\right)\right)$

Let $\theta = \arcsin\left(\frac{-3}{10}\right)$

$\sin\theta = \frac{-3}{10}$

$\sin\theta = -\frac{3}{10}$



(b) $\cos\left(\arccos\left(\frac{1}{2}\right)\right)$

$-1 < \frac{1}{2} < 1$ so

$\cos\left(\arccos\left(\frac{1}{2}\right)\right) = \frac{1}{2}$

(c) $\tan(\arctan(14))$ $\quad -\infty < 14 < \infty$, so

$\tan(\arctan(14)) = 14$

(13) (a) $\sin\left(\cos^{-1}\left(-\frac{1}{2}\right)\right) = \sin\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2}$

(b) $\cos\left(\tan^{-1}(1)\right) = \cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

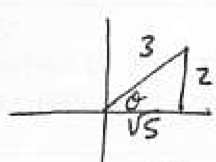
(c) $\tan\left(\sin^{-1}(-1)\right) = \tan\left(-\frac{\pi}{2}\right) =$ undefined.

Not defined.

(15) (a) $\cot\left(\sin^{-1}\left(\frac{2}{3}\right)\right)$

Let $\theta = \sin^{-1}\left(\frac{2}{3}\right)$

$\sin\theta = \frac{2}{3}$

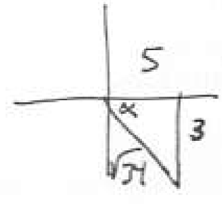


$\cot\left(\sin^{-1}\left(\frac{2}{3}\right)\right) = \cot\theta = \frac{\sqrt{5}}{2}$.

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

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

then $\tan\alpha = \frac{-3}{5}$.

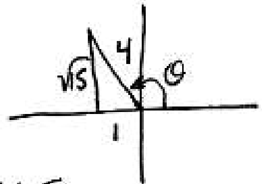


$\sec\left(\tan^{-1}\left(-\frac{3}{5}\right)\right) = \sec\alpha = \frac{\sqrt{34}}{5}$

(c) $\csc(\cos^{-1}(\frac{-1}{4}))$

Let $\theta = \cos^{-1}(\frac{-1}{4})$ then

$\cos\theta = \frac{-1}{4}$



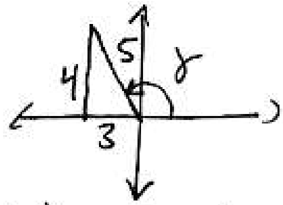
$\csc(\cos^{-1}(\frac{-1}{4}))$

$= \csc(\theta) = \frac{4}{\sqrt{15}} = \frac{4\sqrt{15}}{15}.$

(19) (a) $\sin(2\arccos(-\frac{3}{5}))$

Let $\gamma = \arccos(-\frac{3}{5})$

then $\cos\gamma = -\frac{3}{5}$

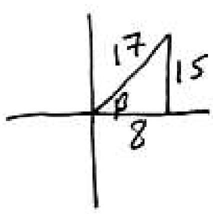


$\sin(2\arccos(\frac{-3}{5})) = \sin(2\gamma) = 2\sin\gamma\cos\gamma$

$= 2\cdot\frac{4}{5}\cdot\frac{-3}{5} = \frac{-24}{25}.$

(b) $\cos(2\sin^{-1}(\frac{15}{17}))$

Let $\beta = \sin^{-1}(\frac{15}{17})$ then $\sin\beta = \frac{15}{17}$



So $\cos(2\sin^{-1}(\frac{15}{17}))$

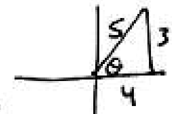
$= \cos(2\beta)$

$= \cos^2\beta - \sin^2\beta$

$= (\frac{8}{17})^2 - (\frac{15}{17})^2$

$= \frac{64}{289} - \frac{225}{289} = \frac{-161}{289}$

(c) $\tan(2\tan^{-1}(\frac{3}{4}))$ Let $\theta = \tan^{-1}(\frac{3}{4})$



$\tan(2\theta) = \frac{2\tan\theta}{1-\tan^2\theta} = \frac{2\cdot\frac{3}{4}}{1-(\frac{3}{4})^2} = \frac{\frac{3}{2}}{1-\frac{9}{16}} = \frac{\frac{3}{2}}{\frac{7}{16}} = \frac{24}{7}.$

(31) (a) As $x \to -1^+$ $\quad \sin^{-1}x \to -\frac{\pi}{2}$

(b) As $x \to 1^-$ $\quad \cos^{-1}x \to 0$

(c) As $x \to \infty$ $\quad \tan^{-1}(x) \to \frac{\pi}{2}$.

(35) $y = \sin^{-1}(x+1)$