20.1 Right-Triangle Trigonometry: The Definitions

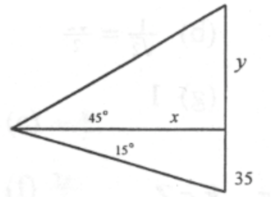
2. $\tan(0.7) = \frac{h}{20} \Rightarrow h = 20\tan(0.7) \approx 16.8\,ft$

3. $\cos\theta = \frac{7}{25} \Rightarrow \theta \approx 73.74^\circ$. $h^2 + 7^2 = 25^2 \Rightarrow h = 24\,ft$

5. $\tan 15^\circ = \frac{35}{x} \Rightarrow x \approx 130.6\,ft$

$\tan 45^\circ = \frac{y}{x} \Rightarrow y = x \approx 130.6\,ft$

$35 + y \approx 165.6\,ft$



20.2 Triangles We Know And Love, And The Information They Give Us

2. (a) $x = \frac{\pi}{3} + k\pi,\quad k \in \mathbf{Z}$

(b) $x = \frac{2\pi}{3} + k\pi,\quad k \in \mathbf{Z}$

5. $\sqrt{3} = \tan\frac{\pi}{3} = \frac{2}{x} \Rightarrow x = \frac{2}{\sqrt{3}}$ in this triangle the hypotenuse is twice the short leg or $r = \frac{4}{\sqrt{3}}$

7. $\frac{\sqrt{2}}{2}$ (b) $-\frac{\sqrt{2}}{2}$ (c) $-\frac{\sqrt{2}}{2}$ (d) $\frac{1}{2}$ (e) $-\frac{1}{2}$ (f) $-\frac{1}{2}$

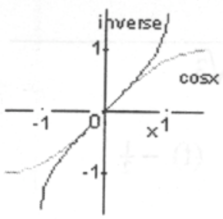
9. $\tan 60^\circ = \frac{h}{15} \Rightarrow h = 15\sqrt{3} \approx 25.98\,ft$

20.3 Inverse Trigonometric Functions

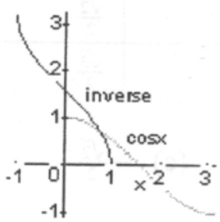
4. (a) domain = [-1, 1], $\sin(\sin^{-1}(x)) = x$ for all x in [-1,1]

(b) domain = all reals, $\sin^{-1}(\sin(x)) = x$ only for $x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$, not = for any other x.

5. (a)



(b)



8. (a) $\arctan(\cos(\pi)) = \arctan(-1) = -\frac{\pi}{4}$ (b) $\cos(\arctan(-\frac{a}{b})) = \frac{b}{\sqrt{a^2+b^2}}$ (positive in quadrant IV

9. (a) $\sin^{-1}(\sin(x)) = x$ (b) $\cos^{-1}(\cos(x)) = x$

10. (a) $\sin^{-1}(\sin(-x)) = \sin^{-1}(-\sin(x)) = -x$ (b) $\cos^{-1}(\cos(-x)) = \cos^{-1}(\cos(x)) = x$

12. Result depends on angle size.

	(a) arcsin(sin(x))	(b) arcos(cos(x))
$(\frac{\pi}{2}, \pi]$	$\pi - x$	x
$[\pi, \frac{3\pi}{2}]$	$\pi - x$	$2\pi - x$
$[\frac{3\pi}{2}, 2\pi)$	$x - 2\pi$	$2\pi - x$

13. result depends on angle size

	(a) arcsin(sin(-x))	(b) arcos(cos(-x))
$(\frac{\pi}{2}, \pi]$	$x - \pi$	x
$[\pi, \frac{3\pi}{2}]$	$x - \pi$	$2\pi - x$
$[\frac{3\pi}{2}, 2\pi)$	$2\pi - x$	$2\pi - x$