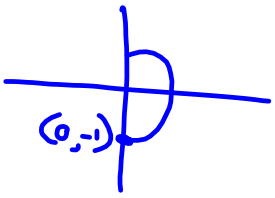
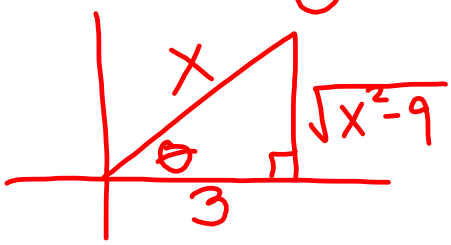
Inverse Trig Functions, cont.

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

2. $\sin^{-1}\left[\tan\left(\frac{-\pi}{4}\right)\right] = \sin^{-1}(-1) = \boxed{\frac{-\pi}{2}}$

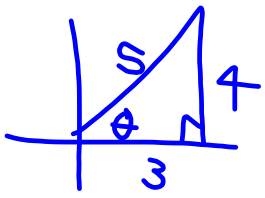


3. $\tan\underbrace{\left(\cos^{-1}\frac{3}{x}\right)}_{\theta}$ $x \geq 3$ $= \boxed{\frac{\sqrt{x^2-9}}{3}}$



4. $\sin\left(2\underbrace{\cos^{-1}\frac{3}{5}}_{\theta}\right) = \sin 2\theta = 2\sin\theta\cos\theta$

$= 2\left(\frac{4}{5}\right)\left(\frac{3}{5}\right) = \boxed{\frac{24}{25}}$



5. $\sin\left(\underbrace{\sin^{-1}\frac{1}{2}}_{a}+\underbrace{\cos^{-1}\frac{3}{5}}_{b}\right)$

$= \sin(a+b) = \sin a\cos b + \cos a \sin b$

$= \left(\frac{1}{2}\right)\left(\frac{3}{5}\right)+\left(\frac{\sqrt{3}}{2}\right)\left(\frac{4}{5}\right)$

$= \boxed{\frac{3+4\sqrt{3}}{10}}$

6. $\cos\left(\underbrace{\sin^{-1}x}_{a}-\underbrace{\cos^{-1}y}_{b}\right)$ $x,y>0$

$0<x,y\leq 1$

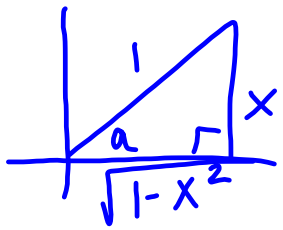
$x=\frac{x}{1}$; $y=\frac{y}{1}$

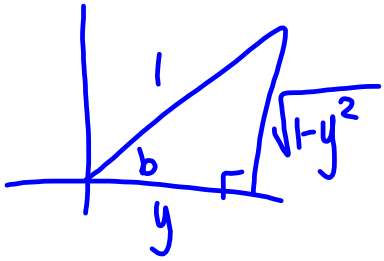
$\cos(a-b) =$

$= \cos a\cos b + \sin a \sin b$

$= \left(\sqrt{1-x^2}\right)(y)+(x)\left(\sqrt{1-y^2}\right)$

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





(Other Trig/Precal Text)

39. $\cos^{-1}\left(\cos\left(\frac{-\pi}{4}\right)\right)$

$\pi/4$

41. $\sin^{-1}\left(\sin\frac{\pi}{5}\right)$

$\pi/5$

43. $\tan^{-1}\left(\tan\frac{2\pi}{3}\right)$

$-\pi/3$

45. $\sin\left(\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)\right)$

$1/2$

47. $\tan\left(\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$

1

53. $\sin^{-1}\left(\sin\frac{7\pi}{6}\right)$

$-\pi/6$

55. $\sin\left(\tan^{-1}\frac{a}{3}\right)$ $a>0$

$\frac{a}{\sqrt{a^2+9}} = \frac{a\sqrt{a^2+9}}{a^2+9}$

63. $\cos\left(\sin^{-1}\frac{\sqrt{2}}{2}+\cos^{-1}\frac{3}{5}\right)$

$\frac{\sqrt{2}}{2}\cdot\frac{3}{5}-\frac{\sqrt{2}}{2}\cdot\frac{4}{5} = \boxed{\frac{-\sqrt{2}}{10}}$

6.6

Solving Trigonometric Equations

$\sin^{-1}\left(\frac{1}{2}\right)$ versus $\sin x = \frac{1}{2}$

$= \frac{\pi}{6}$

one answer in restricted domain of sinx

$x = \frac{\pi}{6} + 2\pi k$

$x = \frac{5\pi}{6} + 2\pi k$

$k \in \mathbb{Z}$ (k is an integer)

infinitely many solutions

$\pi/6$, $5\pi/6$ & anything coterminal w/ those

Solve for $x \in [0,2\pi)$.

2. $2\sin x = \sqrt{3}$

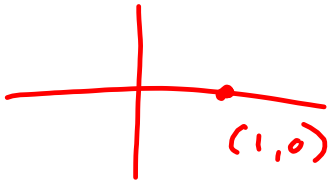
$\sin x = \frac{\sqrt{3}}{2}$

$x = \frac{\pi}{3}, \frac{2\pi}{3}$

4. $\cos x - 1 = 0$

$\cos x = 1$

$x = 0$



6. $2\sin x \cos x = \sqrt{3}\sin x$

Algebra Review

$(x-2)(x-3)(x-4)=0$

$x-2=0$, $x-3=0$, $x-4=0$

$x=2,3,4$

The **Zero Product Property** states:

If $AB=0$, then $A=0$ or $B=0$.

$x^2=9$

$x=\pm 3$

The **Square Root Theorem** states:

If $[f(x)]^2=c$, then $f(x)=\pm\sqrt{c}$

6. $2 \sin x \cos x = \sqrt{3} \sin x$

$2 \sin x \cos x - \sqrt{3} \sin x = 0$

$\sin x (2\cos x - \sqrt{3}) = 0$

$\sin x = 0$

$x = 0, \pi$

$2\cos x - \sqrt{3} = 0$

$\cos x = \frac{\sqrt{3}}{2}$

$x = \frac{\pi}{6}, \frac{11\pi}{6}$

$x^2 = x$

$x = 1$

$x^2 - x = 0$

$x(x-1) = 0$

$x = 0, 1$

Homework for Test #3:

Homework #6 (submitted Wed. 09/17)

- 6.2 #1-41 odd sum, difference, and cofunction identities

Homework #7 (due Friday 09/26)

- 6.1 #1-69 odd proofs
- 6.3 #1-24 all double- and half-angle identities (application & proof)
  #30-36 all
  #49-93 odd
- 6.5 #1-24 all inverse functions
  #25-55 odd inverse functions

Homework #8 (due Friday 10/03?)

- 6.6 #1-21 odd finding solutions between 0 and 2pi
- 6.6 #61-69 odd finding all possible solutions (+2pi*k)
- 6.6 #71-83 odd;
- Examples #3,4,7,8 from solving equations handout
- Test 3 Practice Problems handout

Quiz #5 - Thursday 09/25
Test #3 - Friday 10/3?