#54 10/22/2012 · Sec 4.1 Math 1060

$$\sin^2 x - \sin^2 y = \sin(x+y)\sin(x-y)$$

$$= (\sin x\cos y + \cos x\sin y)(\sin x\cos y - \cos x\sin y)$$

$$\sin^2 x\cos^2 y - \cancel{\sin x\cos y\cos x\sin y} + \cancel{\sin x\cos y\cos x\sin y} - \cos^2 x\sin^2 y$$

$$= \sin^2 x\cos^2 y - \cos^2 x\sin^2 y$$

$$\sin^2 x(1-\sin^2 y) - (1-\sin^2 x)\sin^2 y$$

$$\sin^2 x - \cancel{\sin^2 x\sin^2 y} - \sin^2 y + \cancel{\sin^2 x\sin^2 y}$$

$$\sin^2 x - \sin^2 y \checkmark$$

#26 $\cos\left(\overset{x}{\frac{1}{2}}\right) + \cos\left(\overset{y}{\frac{2}{3}}\right)$

$$\cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$= 2\cos\left(\frac{\frac{1}{2}+\frac{2}{3}}{2}\right)\cos\left(\frac{\frac{1}{2}-\frac{2}{3}}{2}\right)$$

$$\frac{3\cdot 1}{3\cdot 2} + \frac{2\cdot 2}{3\cdot 2}$$

$$\frac{3+4}{6} = \frac{7}{6}$$

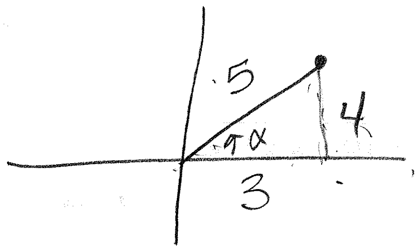
$$\frac{7}{6}\cdot\frac{1}{2} = \frac{7}{12}$$

$$2\cos\left(\frac{7}{12}\right)\cos\left(-\frac{1}{12}\right)$$

$$\boxed{2\cos\left(\frac{7}{12}\right)\cos\left(\frac{1}{12}\right)}$$

$\cos\alpha = 3/5$, Quad I

α



$opp^2 + 3^2 = 5^2$

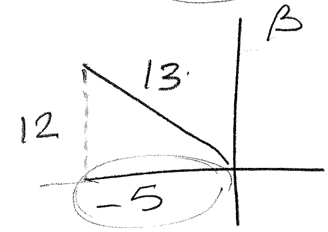
$opp^2 + 9 = 25$

$\sqrt{opp^2} = \sqrt{16}$

$opp = 4$

$\sin(\alpha+\beta)$ Given $\cos\alpha = 3/5$, Quad I, $\sin\beta = 12/13$, Quad II

$\sin\alpha\cos\beta + \cos\alpha\sin\beta$



$\left(\frac{4}{5}\right)\left(-\frac{5}{13}\right) + \left(\frac{3}{5}\right)\left(\frac{12}{13}\right)$

$\frac{-20}{65} + \frac{36}{65} = \boxed{\frac{16}{65}}$

$\sin\left(\frac{x}{2}\right) =$

Example Conditional Equation

$3x + 5 = 14$ $\quad x = 3$

$\quad -5 \quad -5$

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Sec 4.1 Inverse Trig Functions

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

inverses [square Root function
squaring function

$\left(\sqrt{x}\right)^2 = (2)^2$

$x = 4$

$\sin x = \frac{4}{5}$

Remember

Trig function (angle) = Ratio

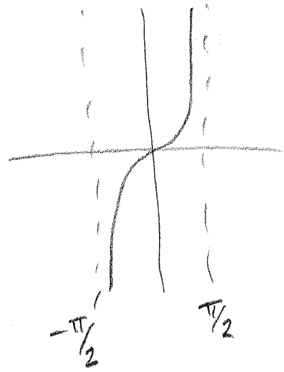
Inverse Trig function (Ratio) = angle

Defn:

For $-1 \le x \le 1$, $y = \sin^{-1}(x)$ provided
$\sin(y) = x$ and $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$
(angles in Quad I and IV)

For $-1 \le x \le 1$, $y = \cos^{-1}(x)$ provided
$\cos(y) = x$ and $0 \le y \le \pi$
(angles in Quad I and II)

$\tan\theta$

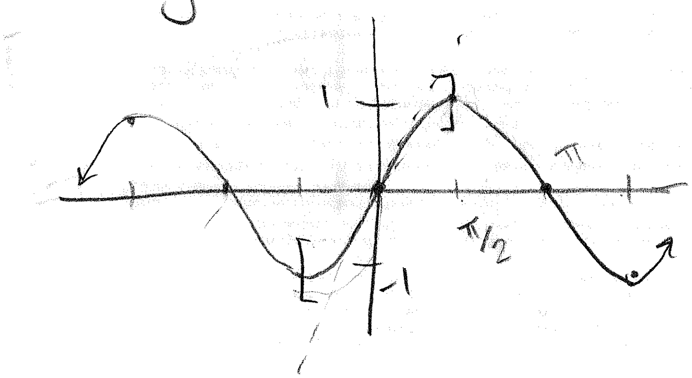


For any Real Number x, $y = \tan^{-1}(x)$ provided $x = \tan(y)$ and $-\frac{\pi}{2} < y < \frac{\pi}{2}$

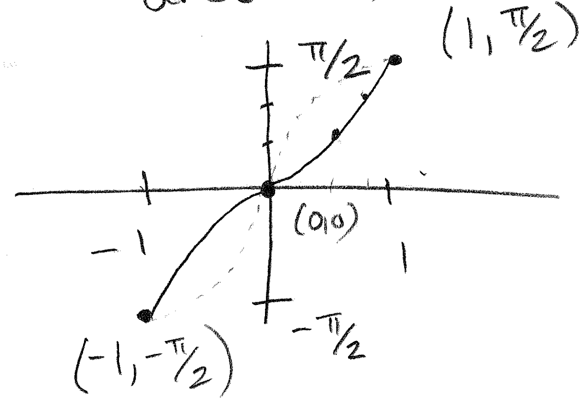
(angles in Quad I & IV)

Graphs

$y = \sin x$



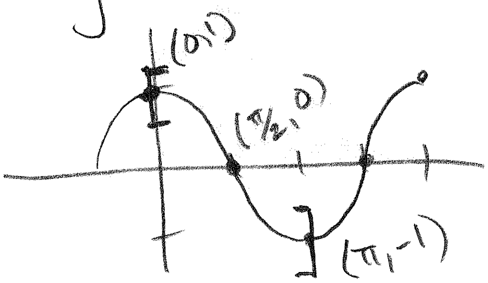
$y = \sin^{-1}(x)$
$= \arcsin(x)$



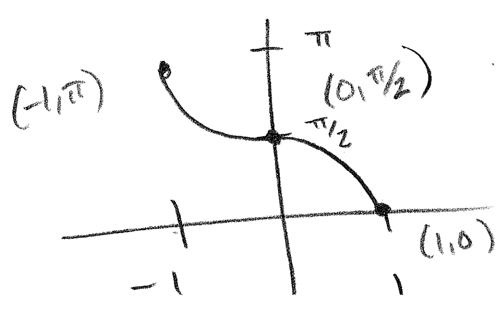
$\frac{\pi}{6}, \frac{1}{2}$

$\pi/3, \frac{\sqrt{3}}{2}$

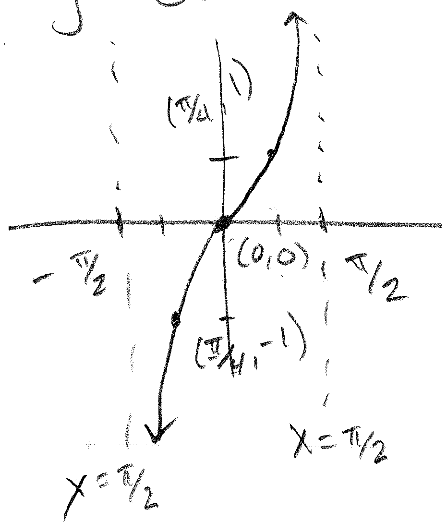
$y = \cos x$



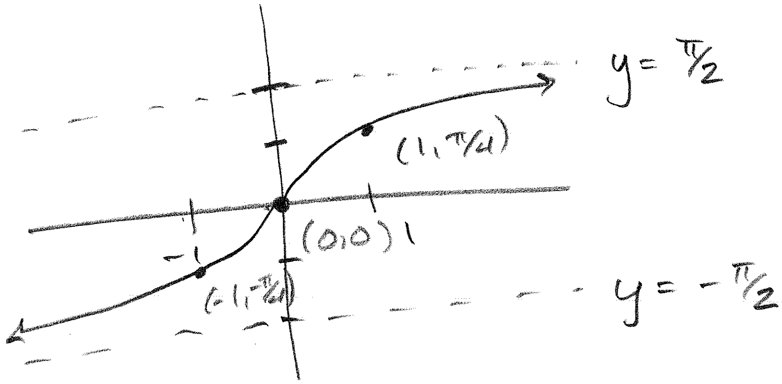
$y = \cos^{-1}(x)$
$= \arccos(x)$



$y = \tan x$



$y = \tan^{-1}(x)$
$= \arctan(x)$



Evaluate in degrees ← Note if not specifically stated whether want degrees or Radians, answer in Radians

$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45°$

$\tan^{-1}(-\sqrt{3}) = -\frac{\pi}{3}$

$= -60°$

$\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) = 135°$

Ref: 45°