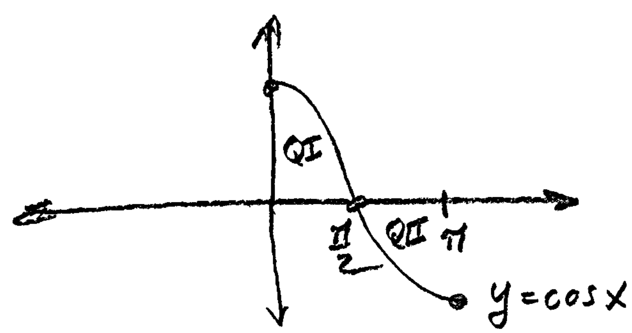
Mth 113 Tues. 4-16-13 Class Notes

Ch 4-3
The Invesve Cosine and Inverse Tangent Functions

Arccos $\Rightarrow$ Restrict Domain of $y = \cos x$ to Quad I $\to$ II
($0 \to \pi$)
$0 \to 180°$
to get a one-to-one function

See $y = \cos^{-1}(x)$ on Pg 148



NOTE: Cos is Negative in QII.

Pg 148 $y = \cos^{-1} x$ means:

Inverse Cosine Function

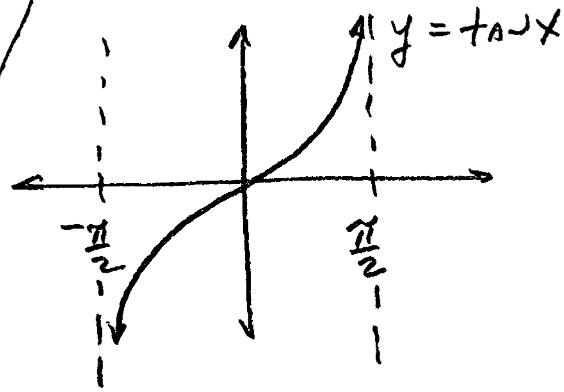
1. $\cos y = x$
2. $0 \le y \le \pi$ or $0 \le y \le 180°$
3. $|x| \le 1$ or $-1 \le x \le 1$

"$\cos^{-1} x$ is the angle in Quadrant I or II whose cos is x"

Inverse of the tangent

$\Rightarrow$ Arctan, restrict domain of $y = \tan x$ to Quadrant I, IV (same as sin)

see $y = \tan^{-1}(x)$ on page 150



Pg 151 $y = \tan^{-1}(x)$ means:

① $\tan y = x$

② $-\frac{\pi}{2} < y < \frac{\pi}{2}$

__NOT__ $\leq$ because $\tan(x)$ is undefined at $-\frac{\pi}{2}, \frac{\pi}{2}$

Unlike $\sin^{-1}(x)$ and $\cos^{-1}(x)$, the x in $\tan^{-1}(x)$ can be any real number.

"$\tan^{-1}(x)$ means the angle in Quadrant I or Quadrant IV whose tangent is x"

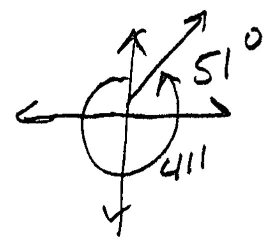
Examples:

Ex1 pg 247 $(5 \operatorname{cis} 137^\circ)^3$ DeMoivre's Theorem

$$\Rightarrow 5^3 \operatorname{cis}(3 \cdot 137)$$

$$125 \operatorname{cis}(411^\circ)$$

$$\boxed{125 \operatorname{cis}(51^\circ)}$$



$$\text{D.T.} \Rightarrow (r \operatorname{cis} \theta)^N = r^N \operatorname{cis}(N\theta)$$

Ex2 p548 $(1+0.8i)^6$

$$|r| = \sqrt{1^2+(.8)^2} = 1.2806$$

$$QI = \theta = \theta' = \tan^{-1}\left(\frac{.8}{1}\right) = 38.659^\circ$$

$$\therefore (1.2806 \text{ Cis } 38.659^\circ)^6$$

$$= (1.2806)^6 \text{ Cis}(6 \cdot 38.659)$$

$$= 4.4104 \text{ Cis}(231.954^\circ)$$

$\therefore$ Back to rectangular

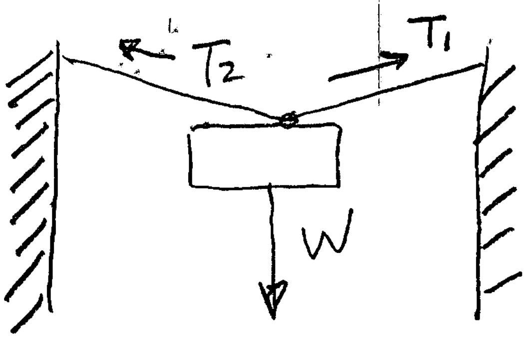
$$x \Rightarrow 4.4104 \cos(231.954^\circ)$$

$$y \Rightarrow -2.718 - 3.4733i$$

Nearest tenth

$$\boxed{\Rightarrow (-2.7 - 3.5i)}$$

Ex 2
pg 233



$T_1\ (400, 45°)$

$W \Rightarrow 800$ lbs

$T_2 = ?$

$$T_1 + T_2 + W = 0 \qquad (800, 270°)$$

$$T_2 = -W + -T_1$$

$-W\ (800, 90)$

$-T_1\ (400, 225°)$

W_x