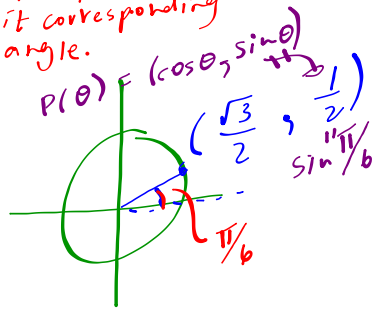
Unit 3: Evaluating a Trig Function for a Number expressed in Radians

ex if $f(x) = \sin x$, $f(\pi/6)$

$f(\pi/6) = \sin \pi/6$

$f(\pi/6) = \frac{1}{2}$

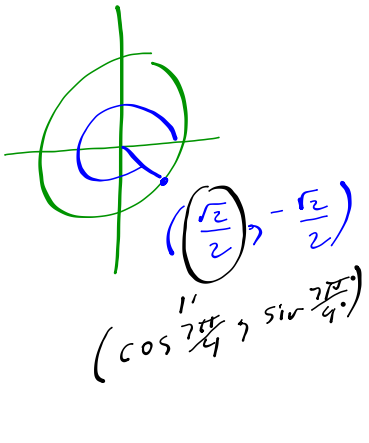
Note: to evaluate without giving a decimal refer to the point on the unit corresponding to given angle.



ex. if $g(x) = \cos x$, find $g\left(\frac{7\pi}{4}\right)$

$g\left(\frac{7\pi}{4}\right) = \cos\frac{7\pi}{4}$

$= \frac{\sqrt{2}}{2}$



ex. if $f(x) = \tan x$, find $f(-\frac{\pi}{4})$

$\frac{\pi}{4}$ isn't a part of WF, so....

$f(x) = \tan x$

$f(x) = \frac{\sin x}{\cos x}$

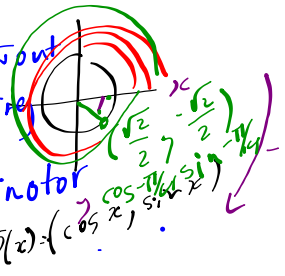
$f(-\frac{\pi}{4}) = \frac{\sin(-\frac{\pi}{4})}{\cos(-\frac{\pi}{4})}$

$f(-\frac{\pi}{4}) = \frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}}$

$f(-\frac{\pi}{4}) = -1$

step i Rewrite function using trig identities. Pick one that has what you (ex. tan), and ideally what you want (ex. sin or cos)

step ii Evaluate without decimals by referring to unit circle. (rationalize denominator if need be).



$f(-\frac{\pi}{6}) = \frac{\sin -\frac{\pi}{6}}{\cos -\frac{\pi}{6}}$

$f(-\frac{\pi}{6}) = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

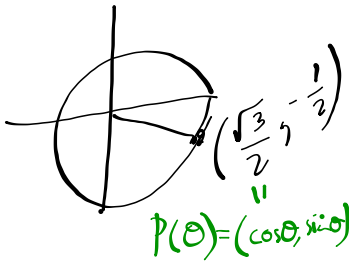
$f(-\frac{\pi}{6}) = -\frac{1}{2} \times \frac{2}{\sqrt{3}}$

$f(-\frac{\pi}{6}) = \frac{-2}{2\sqrt{3}}$

$f(-\frac{\pi}{6}) = \frac{-1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$f(-\frac{\pi}{6}) = \frac{-\sqrt{3}}{3}$

$= -0.577$



$\tan(-\frac{\pi}{6}) = -0.577$

If $f(x) = \sec x$, find $f(\pi/6)$

$f(\pi/6) = \sec \pi/6$

$f(\pi/6) = \dfrac{1}{\cos \pi/6}$

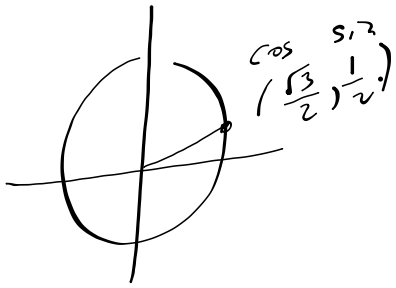
$f(\pi/6) = \dfrac{1}{\sqrt{3}/2}$

$f(\pi/6) = \dfrac{1}{1} \times \dfrac{2}{\sqrt{3}}$

$f(\pi/6) = \dfrac{2}{1 \cdot \sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}}$

$f(\pi/6) = \dfrac{2\sqrt{3}}{\sqrt{9}}$

$f(\pi/6) = \dfrac{2\sqrt{3}}{3}$



$\sqrt[2]{a} \times \sqrt[2]{b} = \sqrt{a \times b}$

$r\sqrt{a} \times s\sqrt{b} = r \times s\sqrt{a \times b}$

if $g(x) = \cot x$, find $g(-\pi/3)$

if $g(x) = \csc x$, find $g\left(\frac{19\pi}{4}\right)$

$g(\theta)$

For $\theta \notin [0, 2\pi[$

step i: find θ' (reduced corresponding angle such that $\theta' \in [0, 2\pi[$

$\theta' = \theta - 2k\pi, \quad k \in \mathbb{Z}$

step i: find $g(\theta')$

$g(x) = \frac{1}{\sin x}$

$g\left(\frac{3\pi}{4}\right) = \frac{1}{\sin \frac{3\pi}{4}}$

$g\left(\frac{3\pi}{4}\right) = \frac{1}{\frac{\sqrt{2}}{2}}$

$g\left(\frac{3\pi}{4}\right) = \frac{1}{1} \times \frac{2}{\sqrt{2}}$

$g\left(\frac{3\pi}{4}\right) = \frac{2}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$g\left(\frac{3\pi}{4}\right) = \frac{2\sqrt{2}}{2}$

$g\left(\frac{3\pi}{4}\right) = \sqrt{2}$

$\theta' = \theta - 2k\pi$

$\theta' = \frac{19\pi}{4} - 2k\pi$ (4.75)

$\theta' = \frac{19\pi}{4} - 4\pi$

$\theta' = \left(\frac{19}{4} - \frac{4 \times 1}{1 \times 4}\right)\pi$

$\theta' = \frac{19 - 16}{4}\pi$

$\theta' = \frac{3\pi}{4}$

$\therefore g\left(\frac{19\pi}{4}\right) = \sqrt{2}$

$\theta \neq \theta'$

$g(\theta) = g(\theta')$

if $f(x) = \tan x$, find $f\left(\frac{29\pi}{6}\right)$

if $g(x) = \tan x$, find $g\left(-\frac{59\pi}{4}\right)$

find

$\theta' = \theta - 2k\pi$

$-14,75$

$\theta' = -\frac{59\pi}{4} - 2k\pi$

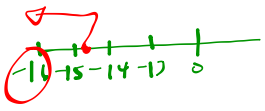
$\theta' = -\frac{59\pi}{4} - (-16\pi)$

$\theta' = -\frac{59\pi}{4} + 16\pi$

$\theta' = \left(-\frac{59}{4} + \frac{16\times 4}{4}\right)\pi$

$\theta' = \left(\frac{-59+64}{4}\right)\pi$

$\theta' = \frac{5}{4}\pi$



since $\theta \notin [0, 2\pi[$

find $\theta' \in [0, 2\pi[$

$\theta' = \theta - 2k\pi$

sub

$2k\pi = -16\pi$

find

$g\left(-\frac{59}{4}\pi\right) = g\left(\frac{5}{4}\pi\right)$

$g\left(\frac{5\pi}{4}\right) = \tan\frac{5\pi}{4}$

$g(5\pi/4) = \frac{\sin 5\pi/4}{\cos 5\pi/4}$

$g(5\pi/4) = \frac{-\sqrt{2}/2}{-\sqrt{2}/2}$

$g(5\pi/4) = 1$

$\therefore g\left(-\frac{59\pi}{4}\right) = 1$

if $f(x) = \sec x$, find $f\left(-\frac{7\pi}{3}\right)$

Prove that $\tan\theta \neq \frac{\sin\theta}{\cos\theta}$

Take the R.S. and rewrite until you get L.S.

Use identities that has what you have and what you want

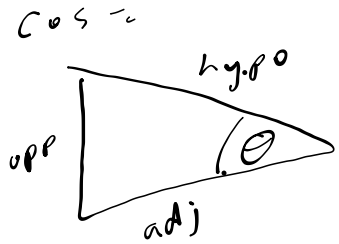
Statements	Justification
$\frac{\sin\theta}{\cos\theta}$	$\cot x = \frac{\cos x}{\sin x}$
$\frac{1}{\cot\theta}$	$\frac{\sin x \cot x}{\cot x} = \frac{\cos x}{\cot x}$
$\tan\theta$	$\frac{\sin x}{\frac{1}{\cos x}} = \left(\frac{\cos x}{\cot x}\right)\frac{1}{\cos x}$
☒	$\frac{1}{\cot x} = \frac{\sin x}{\cos x}$

Prove that $\tan\theta = \frac{\sin\theta}{\cos\theta}$

Take the R.S. and rewrite until you get L.S.

Low identities that has what you have and what you want

Statements	Justification
$\frac{\sin\theta}{\cos\theta}$	
$\frac{\frac{opp}{hypo}}{\frac{adj}{hypo}}$	trig ration $\sin\theta = \frac{opp}{hypo}$
$\frac{opp}{hypo} \times \frac{hypo}{adj}$	
$\frac{opp}{adj}$	
$\tan\theta$	trig ration
RP	
Q.E.D	



Prove that

$\sin x = \frac{1}{\csc x}$

HMWK
P 2.39
#2 a) - j)

HMWK
P 2.41
#3 a) - j)

HMWK
P 3.12 - 3.14
#3.2 / #3.2 practice exercise.