$g(x) = 3\tan\left(\frac{\pi}{10}x - \frac{\pi}{5}\right) - 3$

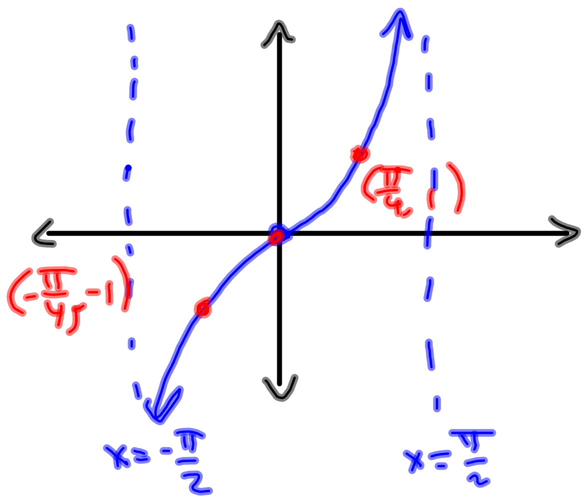
$\frac{\pi}{10}\left[x - 2\right]$

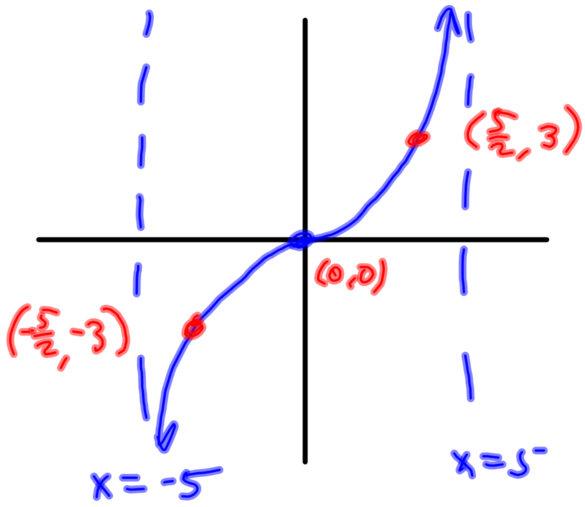
Divide x's by $\frac{\pi}{10}$. Down 3

$\tan x \longrightarrow 3\tan\left(\frac{\pi}{10}x\right) \longrightarrow 3\tan\left(\frac{\pi}{10}(x-2)\right)-3$

Multiply y's by 3

Right 2

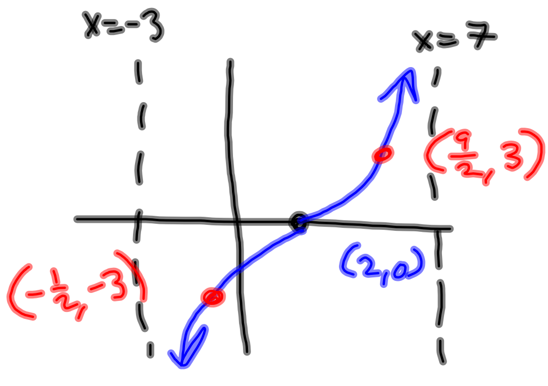




$-\frac{5}{2}+2 = \frac{-5+4}{2}$

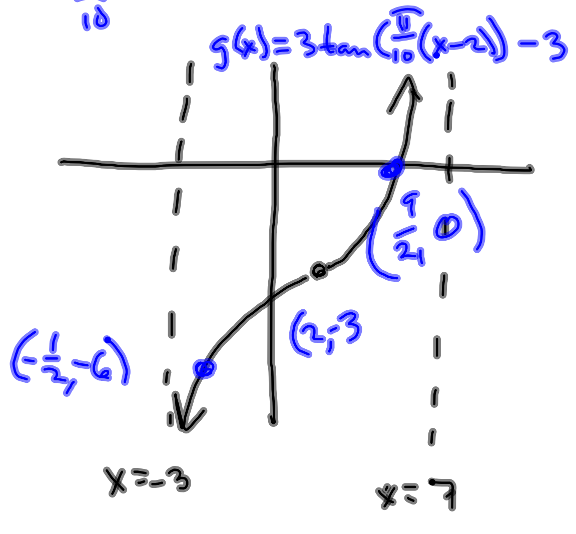
$\frac{\frac{\pi}{4}}{\frac{\pi}{10}} = \frac{\pi}{4}\cdot\frac{10}{\pi} = \frac{5}{2}$

$\frac{\frac{\pi}{2}}{\frac{\pi}{10}} = \frac{\pi}{2}\cdot\frac{10}{\pi} = 5$



$3\tan\left(\frac{\pi}{10}(x-2)\right)$

Left off needing to move down 3



I want a cotangent that's: — Slow it down.

1. Horizontal stretch by factor of 3 — $\cot(\frac{1}{3}x)$
2. * Vertical stretch by " " 7 — $7\cot(\frac{1}{3}x)$
3. Right 2 — $7\cot(\frac{1}{3}(x-2))$ Delay by 2
4. * Down 11 — $7\cot(\frac{1}{3}(x-2))-11$

---

§2.5 stuff

New Stuff!

$\frac{1}{2}$-Angle

$$\sin\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1-\cos u}{2}}$$

$$\cos\left(\frac{u}{2}\right)=\pm\sqrt{\frac{1+\cos u}{2}}$$

by solving Power-Reducing formulas for $\sin\theta$ & $\cos\theta$, then replacing θ by $\frac{\theta}{2}$.

Pyth.

$\sin^2 x+\cos^2 x=1$

$\tan^2 x+1=\sec^2 x$

$\cot^2+1=\csc^2 x$

Doubles:

$\sin(2\theta)=2\sin\theta\cos\theta$

$\cos(2\theta)=\cos^2\theta-\sin^2\theta$

Sums:

$\sin(u+v)=\sin u\cos v+\sin v\cos u$

$\cos(u+v)=\cos u\cos v-\sin u\sin v$

Power-Reducing:

$$\sin^2\theta=\frac{1-\cos(2\theta)}{2}$$

$$\cos^2\theta=\frac{1+\cos(2\theta)}{2}$$

ODD & EVEN

$\sin(-x)=-\sin(x)$

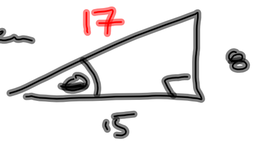
$\cos(-x)=\cos(x)$

+

#s 53-58 in §2.5:

$\frac{1}{2}$-angle

Given



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

$$\sin\left(\frac{\theta}{2}\right)=\pm\sqrt{\frac{1-\cos(\theta)}{2}}$$

Observe which quadrant θ & then $\frac{\theta}{2}$ will be in.

Take "+"

$$\sin\left(\frac{\theta}{2}\right)=\sqrt{\frac{1-\cos\theta}{2}}$$

$$=\sqrt{\frac{1-\frac{15}{17}}{2}}=\sqrt{\frac{\frac{2}{17}}{\frac{2}{1}}}$$

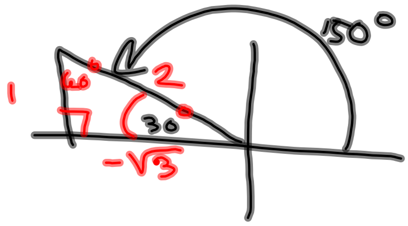
$$=\sqrt{\frac{1}{17}}=\frac{\sqrt{1}}{\sqrt{17}}=\frac{1}{\sqrt{17}}=\frac{\sqrt{17}}{17}$$

OK

Mar 5-8:19 AM

$\sin(75^\circ)$ by $\frac{1}{2}$-angle

$$\frac{\theta}{2} = 75^\circ = \frac{150^\circ}{2}$$



$$\sin(75^\circ) = + \sqrt{\frac{1-\cos(150^\circ)}{2}}$$

$$= \sqrt{\frac{1+\frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2+\sqrt{3}}{2}}{2}} = \sqrt{\frac{2+\sqrt{3}}{4}} = \frac{\sqrt{2+\sqrt{3}}}{2}$$

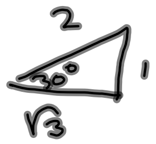
Check:

$75^\circ = 30^\circ + 45^\circ$

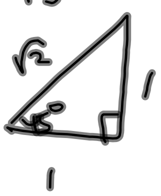
One to figure out later: Why?

I'll get back 2 u.

$$\sin(30^\circ + 45^\circ) = \sin 30^\circ \cos 45^\circ + \sin 45^\circ \cos 30^\circ$$

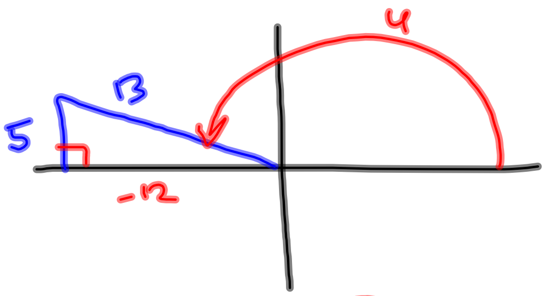


$$= \frac{1}{2}\cdot\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2} = \frac{1+\sqrt{3}}{2\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}+\sqrt{6}}{2\cdot 2}$$



$$= \frac{\sqrt{2}+\sqrt{6}}{4} = \frac{\sqrt{2}(1+\sqrt{3})}{4}$$

#s 53-58 are like this one, above, but I hope you do 'em better than I did this one.



#68 Given $\sin u = \frac{5}{13}$, find

$\sin\left(\frac{u}{2}\right)$, $\cos\left(\frac{u}{2}\right)$, $\tan\left(\frac{u}{2}\right)$

Given $\frac{\pi}{2} < u < \pi$ QII

$\frac{\pi}{2} < u < \pi$

$\frac{\pi}{4} < \frac{u}{2} < \frac{\pi}{2}$

cosine & sine positive for $\frac{u}{2}$.

$$\sin\left(\frac{u}{2}\right) = +\sqrt{\frac{1-\cos(u)}{2}} = \sqrt{\frac{1-\left(-\frac{12}{13}\right)}{2}} = \sqrt{\frac{\frac{25}{13}}{2}} = \frac{5}{\sqrt{26}}$$

$$\cos\left(\frac{u}{2}\right) = \sqrt{\frac{1+\cos(u)}{2}} = \sqrt{\frac{1-\frac{12}{13}}{2}} = \sqrt{\frac{\frac{1}{13}}{2}} = \frac{1}{\sqrt{26}}$$

Fin is §2.5 next time.