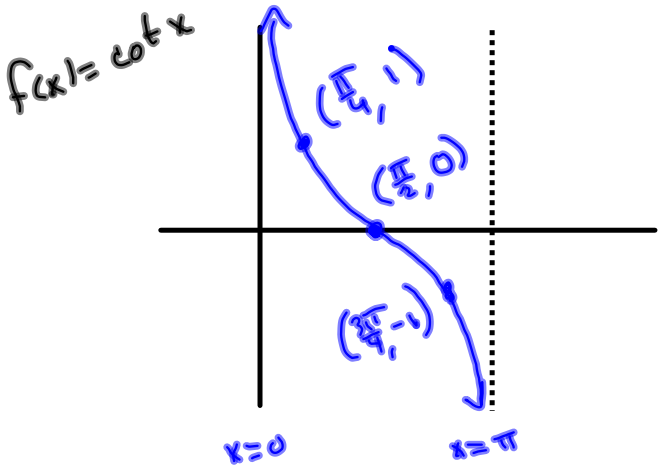
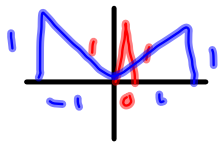
6. Sketch one period of the graph of $g(x) = 5\cot\left(\frac{\pi}{4}x + \pi\right) + 7$, by transforming the function $f(x) = \cot(x)$. I want to see the 3 key points corresponding to $x = \frac{\pi}{4}, \frac{\pi}{2}$, and $\frac{3\pi}{4}$, in the graph of $f(x)$. I want to see where these points are moved by each succeeding transformation you apply to $f(x)$, and where they show up in the final graph of $g(x)$.

7. Now that you have the graph of g, sketch the graph of $y = 5\sqrt{3} + 7$ on the same coordinate axes, and show where it intersects the graph of g.



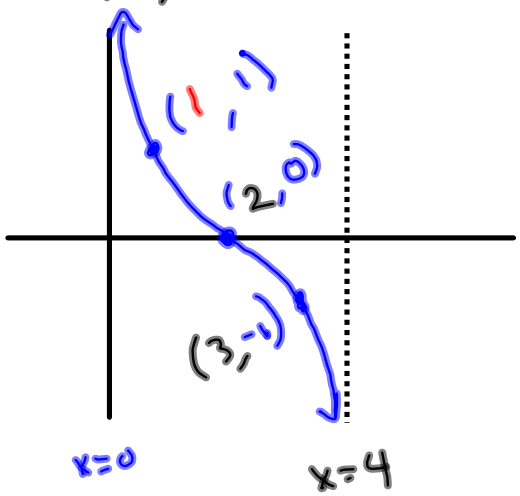


① Hor. stretch
② Ver. stretch
③ Hor. shift
④ Vert. shift.

$\frac{\pi}{4}x + \pi = \frac{\pi}{4}(x + 4)$

$(x, y) \longrightarrow \left(\frac{x}{\frac{\pi}{4}}, y\right)$

① $\cot\left(\frac{\pi}{4}x\right)$



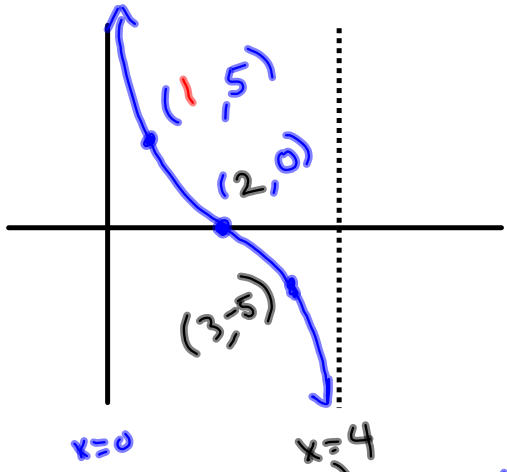
$\frac{\frac{\pi}{4}}{\frac{\pi}{4}} = 1$

$\frac{\frac{\pi}{2}}{\frac{\pi}{4}} = 2$

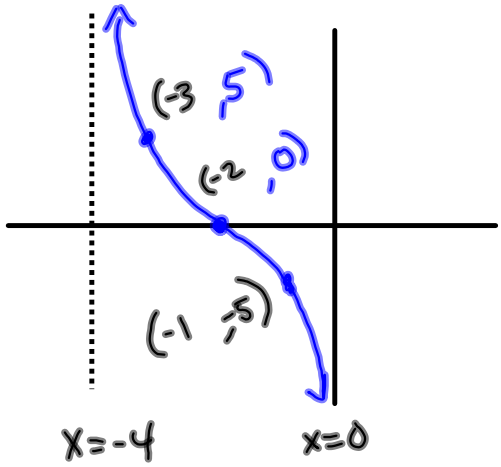
$\frac{\frac{3\pi}{4}}{\frac{\pi}{4}} = \frac{3\pi}{4} \cdot \frac{4}{\pi} = 3$

① $\cot\left(\frac{\pi}{4}x\right)$

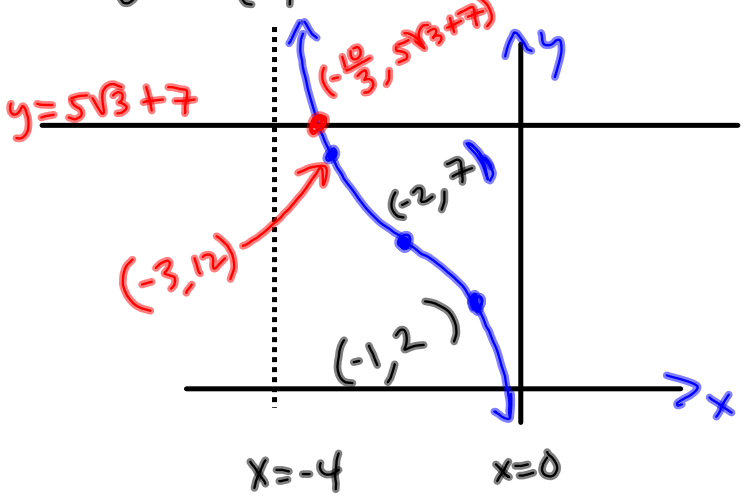
② $5\cot\left(\frac{\pi}{4}x\right)$ $(x,y) \longrightarrow (x,5y)$



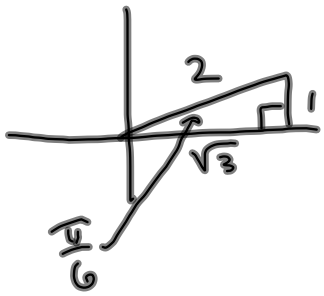
③ $5\cot\left(\frac{\pi}{4}(x+4)\right)$ $(x,y) \longrightarrow (x-4,y)$



$5\cot\left(\frac{\pi}{4}(x+4)\right)+7 \quad (x,y) \longrightarrow (x, y+7)$



Graph $y=5\sqrt{3}+7$ & find its intersection with $g(x)$



$$5\cot\left(\tfrac{\pi}{4}(x+4)\right)+7 = 5\sqrt{3}+7$$

$$5\cot\left(\tfrac{\pi}{4}(x+4)\right) = 5\sqrt{3}$$

$$\cot\left(\tfrac{\pi}{4}(x+4)\right) = \sqrt{3}$$

$$\tfrac{\pi}{4}(x+4) = \tfrac{\pi}{6}$$

$$x+4 = \tfrac{\pi}{6}\cdot\tfrac{4}{\pi} = \tfrac{2}{3}$$

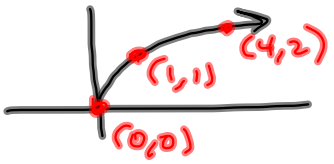
$$x = \tfrac{2}{3}-4 = \tfrac{2-12}{3} = -\tfrac{10}{3}$$

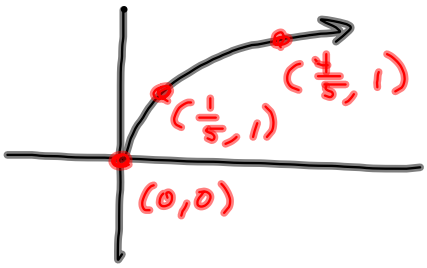
$$= -3\tfrac{1}{3}$$

$f(x) = \sqrt{x}$

$f(5x) = \sqrt{5x}$

$(x, y) \longrightarrow \left(\frac{x}{5}, y\right)$



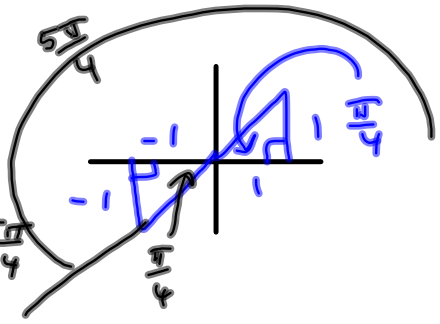


Feb 24-8:25 AM

§ 2.3

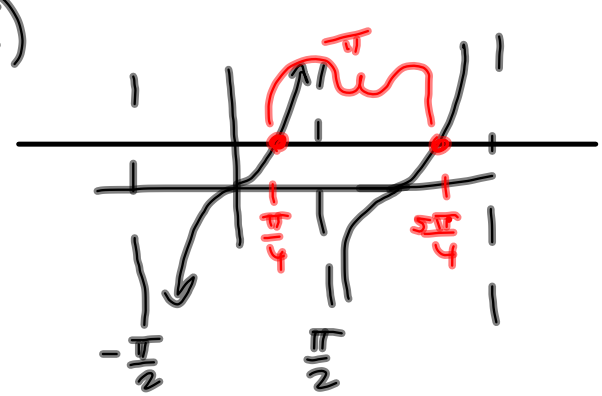
$\tan(3x) = 1$

$3x = \frac{\pi}{4}$ OR $3x = \frac{5\pi}{4}$



$\tan^{-1} x$ Key will give you the $\frac{\pi}{4}$

why? $(-\frac{\pi}{2}, \frac{\pi}{2})$



$3x = \frac{\pi}{4} + \pi$

$3x = \frac{\pi}{4} - \pi$ also works

Book Answer:

$3x = \frac{\pi}{4} + n\pi$, $n \in \mathbb{Z}$

$x = \frac{\pi}{12} + \frac{n\pi}{3}$, $n \in \mathbb{Z}$

Notice this picks up the $\frac{5\pi}{4}$.

My preference:

$x \in \{\frac{\pi}{4} + n\pi \mid n \in \mathbb{Z}\}$

"x is a member of" — solution set

#s 49-58 optional.
we do have a nice grapher available.

#s 39-44, no restriction on X

" $x = \frac{\pi}{7} + 2n\pi$ "

#s 25-38 Restricted. $x \in [0, 2\pi]$ #s 59-74

Be sensible. I like #89, 95

↳ seconds are the units.

#5 sqrd 2

$\tan^2 x + 3\tan x + 1 = 0$

$u^2 + 3u + 1 = 0$ Quadratic Formula or Complete the Square.

$u^2 + 3u = -1$

$u^2 + 3u + \left(\frac{3}{2}\right)^2 = -1 + \frac{9}{4}$

$\left(u + \frac{3}{2}\right)^2 = \frac{5}{4}$

$u + \frac{3}{2} = \pm\frac{\sqrt{5}}{2}$

$u = \frac{-3 \pm \sqrt{5}}{2}$ → $\frac{-3+\sqrt{5}}{2}$, $\frac{-3-\sqrt{5}}{2}$

Need a calculator to evaluate these.