$8 \sin\left(\frac{\pi}{14}x - \frac{5\pi}{13}\right) + 13$

Amp: up & Down from mid.

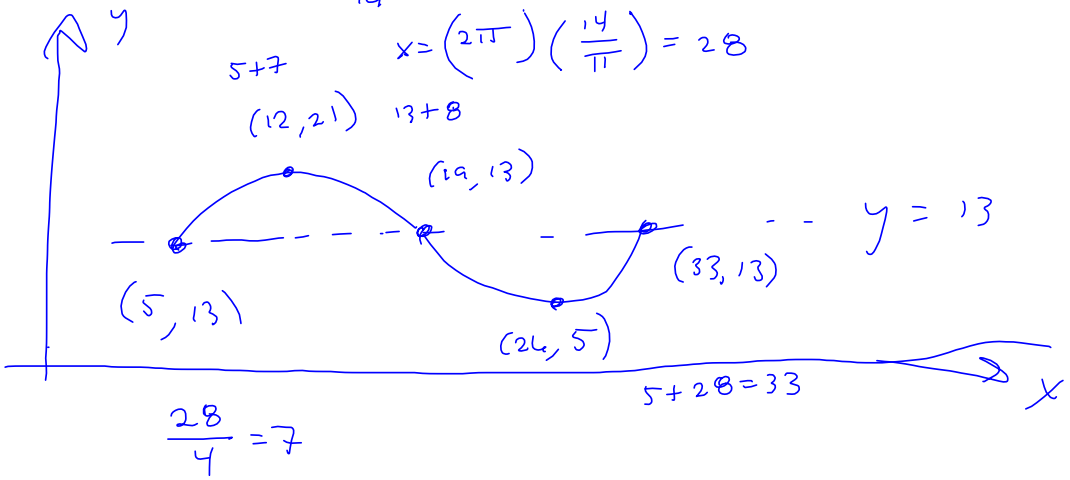
$T = 28$

$y = 13$ mid.

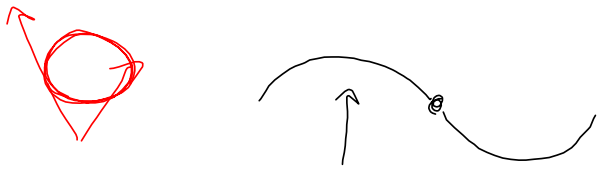
$\frac{\pi}{14}(x - 5)$ start at $x = 5$

$\frac{\pi}{14}x = 2\pi$

$x = \left(2\pi\right)\left(\frac{14}{\pi}\right) = 28$



$\frac{28}{4} = 7$



Reasoning from known period to coefficient of x inside the sine/cosine func.

$T = 30 \rightsquigarrow \frac{\pi}{15}$

$bx = 2\pi$ when $x = 30$

$30b = 2\pi$

$b = \frac{2\pi}{30} = \frac{\pi}{15}$

$\sin\left(\frac{\pi}{15}x\right)$

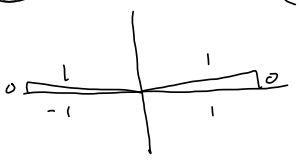
$\pi/15\,x$ $\frac{\pi}{15x}$?

$\left(\frac{\pi}{15}\right)x$

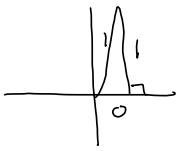
11. (5 pts) Sketch the pictures corresponding to:
   a. $\sin(x)=0$
   b. $\sin(x)=1$
   c. $\sin(x)=\frac{\sqrt{3}}{2}$
   d. $\sin(x)=\frac{1}{\sqrt{2}}$
   e. $\cos(x)=0$

Some of these only really have one picture.

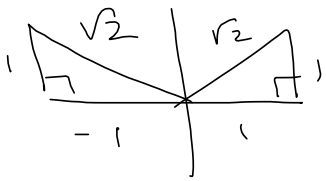
(a) $\sin x = 0$



(b) $\sin x = 1$



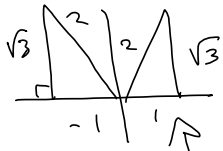
(d) $\sin x = \frac{1}{\sqrt{2}}$



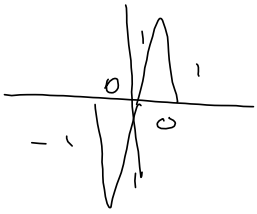
(c) $\sin x = \frac{\sqrt{3}}{2}$

$2^2 - (\sqrt{3})^2 = 4 - 3 = 1$

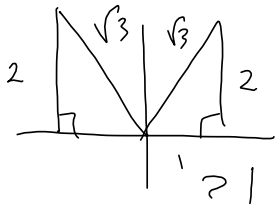
$\sqrt{1} = 1$



(e) $\cos x = 0$

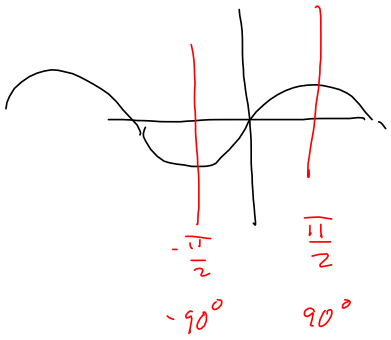


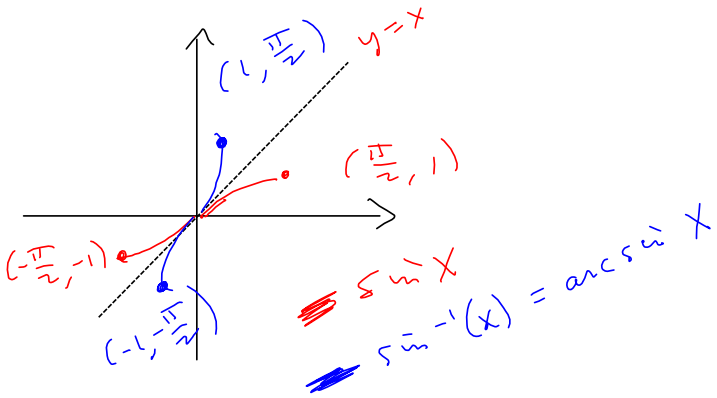
xtra $\sin x = \frac{2}{\sqrt{3}}$



impossible!

12. (5 pts) Sketch the graph of one period of $y = \sin(x)$ (restricted to make it 1-to-1) *and* $y = \arcsin(x)$ on the same set of coordinate axes. I want to see the function and its inverse in the same picture. Label key points as ordered pairs (ALWAYS). State the domain and range of the restricted sine function and its inverse.





Also may ask for $\cos x$ or $\tan x$

Usually no $\sec x, \csc x, \cot x$.

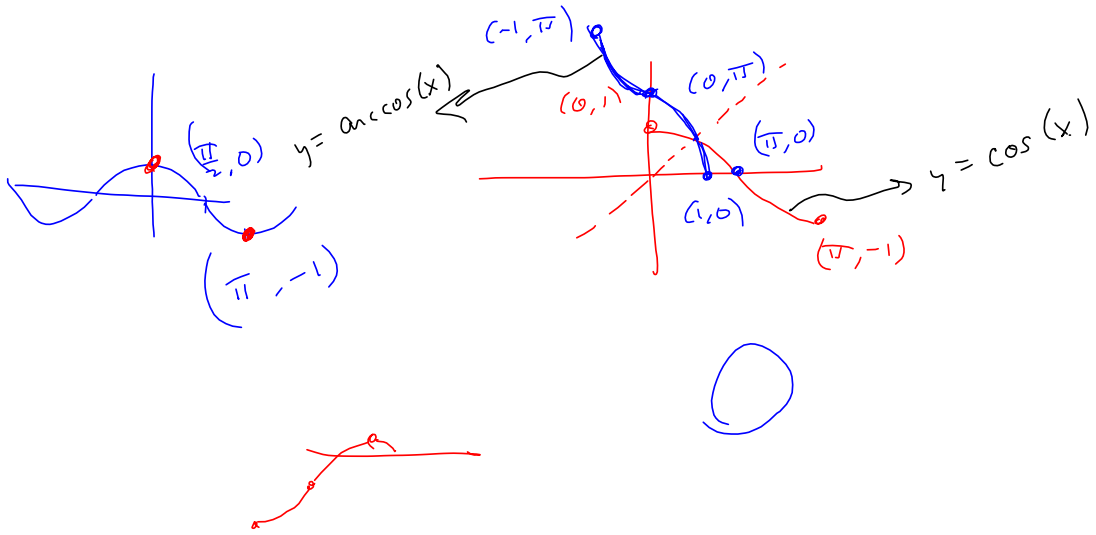
$f(x) = \sin x \Rightarrow$

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

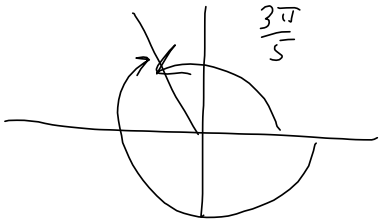
$\mathcal{D}(f) = [-\frac{\pi}{2}, \frac{\pi}{2}] = \mathcal{R}(f^{-1})$

$\mathcal{R}(f) = [-1, 1] = \mathcal{D}(f^{-1})$

13. (5 pts) Sketch the graph of one period of $y = \cos(x)$ (restricted to make it 1-to-1) *and* $y = \arccos(x)$ on the same set of coordinate axes. I want to see the function and its inverse in the same picture. Label key points as ordered pairs (ALWAYS). State the domain and range of the restricted cosine function and its inverse.



$$\frac{23\pi}{5} = \left(\frac{20+3}{5}\right)\pi = 4\pi + \frac{3\pi}{5}$$



$$\frac{3\pi}{5} - 2\pi = \frac{3-10}{5}\pi = -\frac{7\pi}{5}$$

4 26 7 252

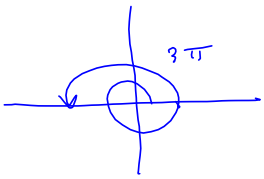
$\frac{3\pi}{5}$, $-\frac{7\pi}{5}$

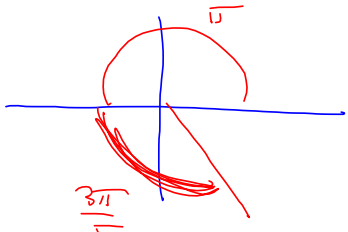
108° , -252°

$$\left(\frac{3\pi}{5}, \frac{180^\circ}{\pi}\right) = 108^\circ$$

36

$$\frac{18\pi}{5} = \frac{15\pi}{5} + \frac{3\pi}{5} = 3\pi + \frac{3\pi}{5}$$





$$\pi + \frac{3\pi}{5} = \frac{8\pi}{5}$$

$$\frac{8\pi}{5} - 2\pi = \frac{8-10}{5}\pi = -\frac{2\pi}{5}$$

(2) $r = 6$, $\theta = 7000^\circ = (7000)\left(\frac{\pi}{180}\right)$

$s = r\theta = (6)\left(\frac{350\pi}{9}\right) = \frac{700\pi}{3}$ inches.

No calculator.

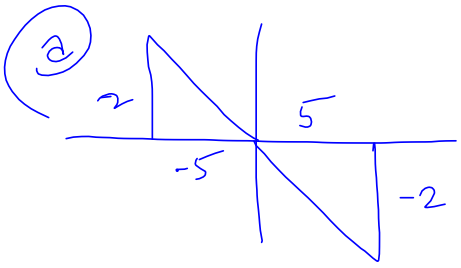
(3) $A = \frac{1}{2}r^2\theta = \frac{1}{2}(6)^2\left(\frac{5\pi}{4}\right) = 18\left(\frac{5\pi}{4}\right) = \frac{45\pi}{2}$ cm^2

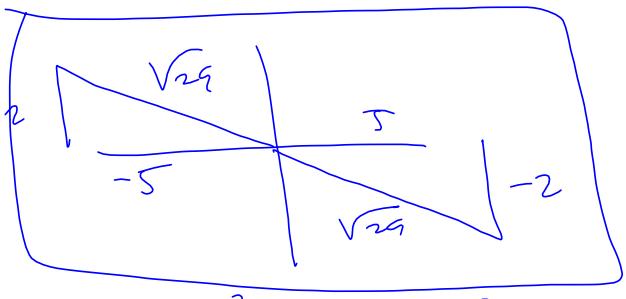
$\frac{350}{\cancel{700}\ \cancel{18}\ 9} =$

(4) $\cot\theta = -\frac{5}{2}$

$\tan\theta = -\frac{2}{5}$

(a)

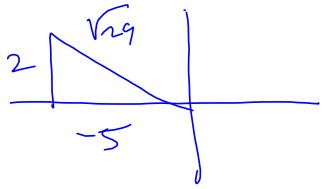




Idiot! out of order

$5^2 + 2^2 = 25 + 4 = 29$

(c) $\cos\theta < 0 \Rightarrow$



$\cos^{-1}\left(-5/\sqrt{29}\right) \approx 2.761086277$

$\approx 158.1985905^\circ$

$\Rightarrow \theta \approx 2.761$ OR 158.199°

(5) $\sin\theta = \frac{2}{\sqrt{29}}$ $\quad \csc\theta = \frac{\sqrt{29}}{2}$

$\cos\theta = -5/\sqrt{29}$ $\quad \sec\theta = \frac{-\sqrt{29}}{5}$

$\tan\theta = -\frac{2}{5}$ $\quad \cot\theta = -\frac{5}{2}$

(d) $\theta \in \{ 2.761 + 2\pi n \mid n \in \mathbb{Z} \}$

$= \{ 158.199^\circ + 360^\circ n \mid n \in \mathbb{Z} \}$

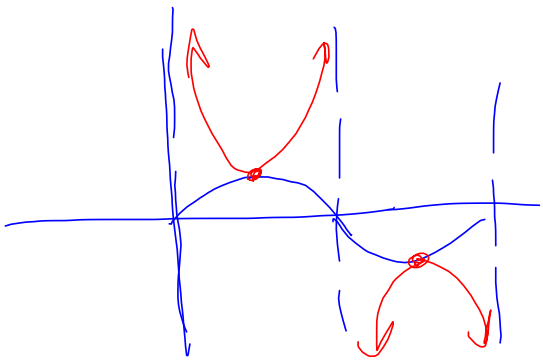
(5) $\sin x$, $\csc x = \frac{1}{\sin x}$

Inverse w.r.t. function composition

$\sin^{-1} x$ = ? → $\arcsin(x)$

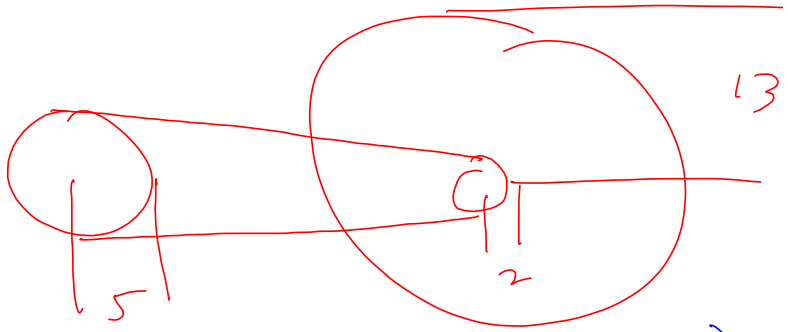
→ $\csc(x)$

Arithmetic inverse w/ respect to multiplication



$\sin(x)$

$\csc(x)$



$$\left(\frac{1.3 \text{ rev front}}{1 \text{ sec}}\right)\left(\frac{5 \text{ rev back}}{2 \text{ rev front}}\right)\left(\frac{2\pi \text{ radians}}{1 \text{ rev back}}\right)\left(13 \text{ in}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right)$$

$\frac{\theta}{\text{sec}}$ $\qquad$ $s = r\theta$ $\qquad$ r

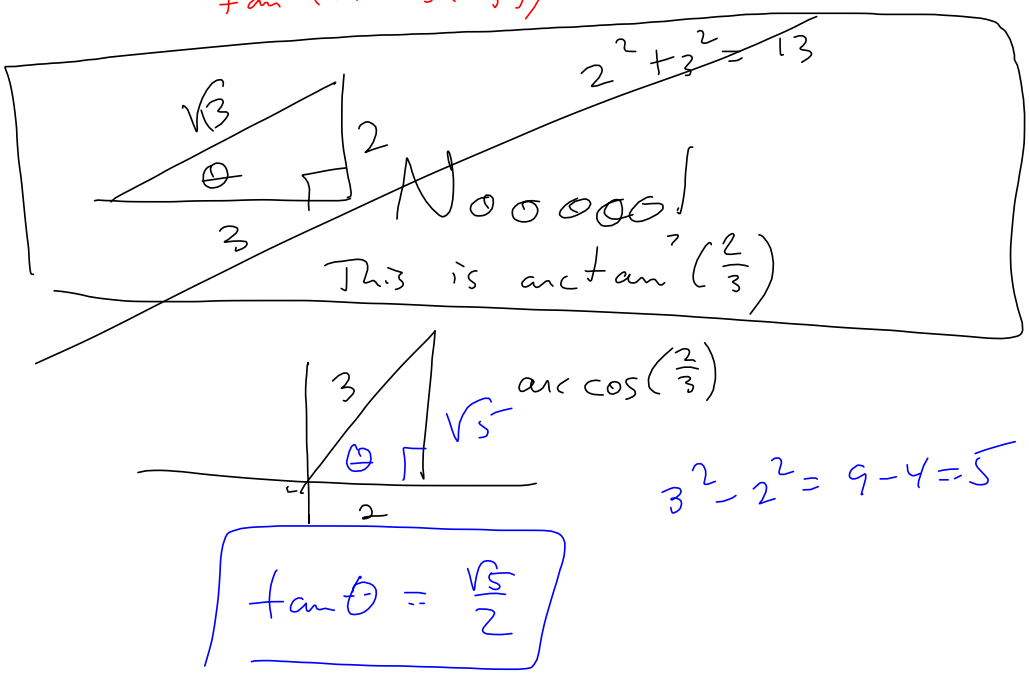
$= A \cdot \frac{\text{ft}}{\text{sec}}$

Followup: miles/hr

$$= \left(A \frac{\text{ft}}{\text{sec}}\right)\left(\frac{60 \text{ mi/hr}}{88 \text{ ft/sec}}\right) \quad \frac{\text{mi}}{\text{hr}}$$

$A = \frac{A}{1}$

$\tan(\arccos(\frac{2}{3})) = \tan\theta$



$3^2-2^2 = 9-4 = 5$

$\tan\theta = \frac{\sqrt{5}}{2}$