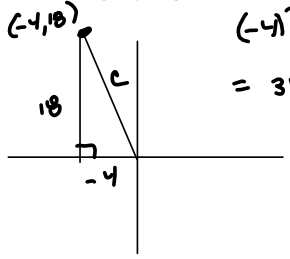
S 1.4

6. The point is on the terminal side of an angle in standard position. Find the exact values of the six trigonometric functions the angle.

(−4, 18)



$a^2+b^2=c^2$

$(-4)^2+18^2 = 16+324$

$= 340 = c^2$

$c = \pm\sqrt{340} \rightsquigarrow c = \sqrt{340}$

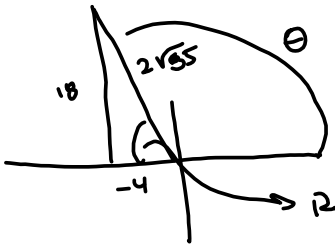
b/c long side (hypotenuse) is always positive.

18 · 18 · 144 · 180 · 324

2 | 340 · 2 | 170 · 5 | 85 · 17

$\sqrt{340} = \sqrt{2^2 \cdot 5 \cdot 17}$

$= 2\sqrt{85}$



Reference Angle

$\sin(\theta) = \frac{18}{2\sqrt{85}} = \frac{9}{\sqrt{85}}$ $\quad \csc(\theta) = \frac{\sqrt{85}}{9}$

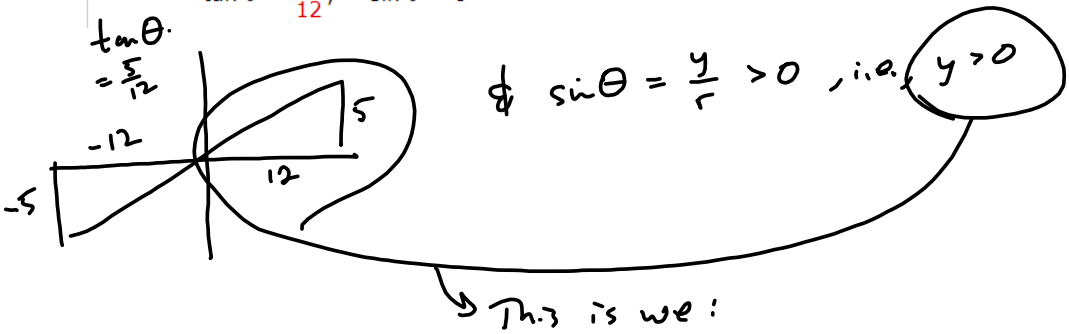
$\cos(\theta) = \frac{-4}{2\sqrt{85}} = \frac{-2}{\sqrt{85}}$ $\quad \sec(\theta) = -\frac{\sqrt{85}}{2}$

$\tan(\theta) = \frac{18}{-4} = -\frac{9}{2}$ $\quad \cot(\theta) = -\frac{2}{9}$

11. Find the exact values of the remaining trigonometric functions of θ satisfying the given conditions. (If an answer undefined, enter UNDEFINED.)

$\tan\theta = \frac{5}{12}, \quad \sin\theta > 0$

$\tan\theta = \frac{5}{12}$



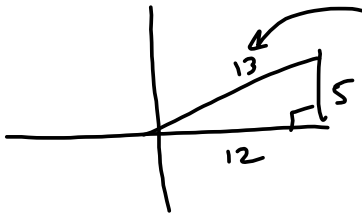
& $\sin\theta = \frac{y}{r} > 0$, i.e. $y > 0$

This is we!

Pythagorus:

$5^2+12^2 = 25+144 = 169$

$\sqrt{169} = \sqrt{13^2} = 13$



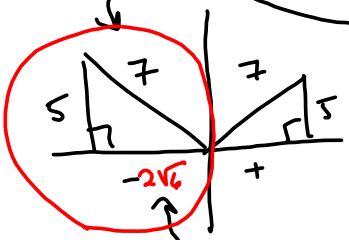
$\sin(\theta) = \frac{5}{13}$

$\cos(\theta) = \frac{12}{13}$

$\tan(\theta) = \frac{5}{12}$

etc. Flip it!

$\sin(\theta) = \frac{5}{7}$, $\tan(\theta) < 0$



Pythagorus: $a^2+b^2=c^2 \Rightarrow a^2=c^2-b^2$

$5^2 + x^2 = 7^2 \longrightarrow$

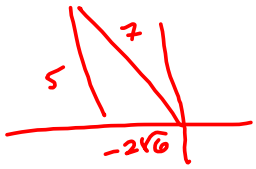
$7^2 - 5^2 = 49-25 = 24 = x^2 \longrightarrow$

$x = \pm\sqrt{24}$.

But we're in QII, so $x<0$, i.e.,

$x = -\sqrt{24}$

$\sqrt{2^3 \cdot 3} = \sqrt{2^2 \cdot 2^1 \cdot 3} = 2\sqrt{2 \cdot 3} = 2\sqrt{6}$



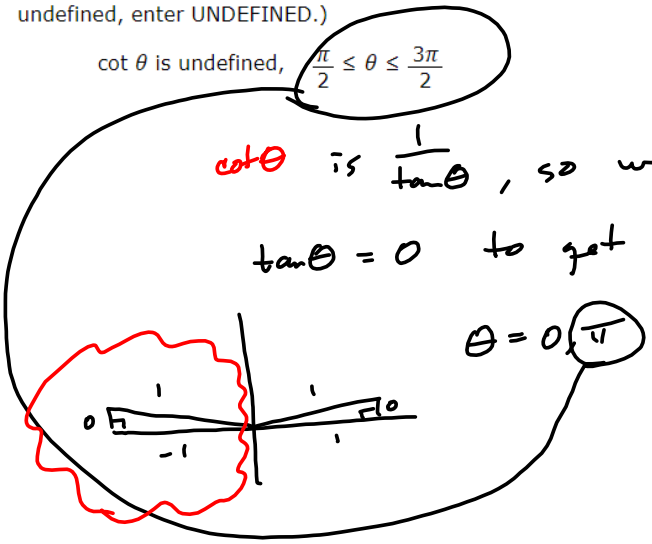
$\sin(\theta) = \frac{5}{7}$

$\cos(\theta) = \frac{-2\sqrt{6}}{7}$ etc.

$\tan(\theta) = \frac{5}{-2\sqrt{6}}$

13. Find the exact values of the remaining trigonometric functions of θ satisfying the given conditions. (If an answer is undefined, enter UNDEFINED.)

cot θ is undefined, $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$



$\frac{1}{0}$?

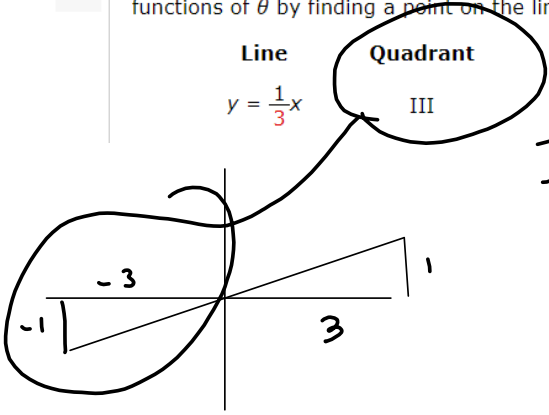
$\sin(\theta) = 0$ $\csc(\theta) = DNE$

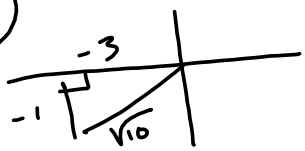
$\cos(\theta) = -1$ $\sec(\theta) = -1$

$\tan(\theta) = 0$ $\cot(\theta) = DNE$

14. The terminal side of θ lies on the given line in the specified quadrant. Find the exact values of the six trigonometric functions of θ by finding a point on the line.

Line	Quadrant
$y = \frac{1}{3}x$	III





$1^2 + 3^2 = 1 + 9 = 10 \rightarrow \sqrt{10}$

etc.

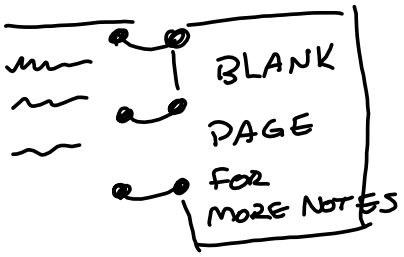
Pointers:

Use a 3-ring binder so you can leave off a problem that's defeating you, leave the rest of the page blank. Start a fresh page. When you defeat that problem, you can insert the correct work in the appropriate place.

Spiral notebooks suck. You can't do this with them.

When I was a student, I used a ream of copier paper and a 3-hole punch.

work inside of paper.



Breaking Trail/Pathfinder

SKIM the sections ahead of time. Write down the big stuff (the stuff in the boxes, important figures/pictures/diagrams.

Attempt/Begin a few exercisees from the future work.

That way when I talk about it, you already sort of have an idea.

DON'T COME TO CLASS AN EMPTY VESSEL. YOU WON'T BE FILLED.

Extra prep up-front is the hardest habit to build but the biggest time-saver of all.

S 1.5

27. Use a graphing utility to graph the function. Include two full periods. Be sure to choose an appropriate viewing window.

$y = -4 \sin\left(\frac{2}{3}x - \frac{\pi}{3}\right)$

I'll show you how I'd attack it by hand with a scientific calculator.

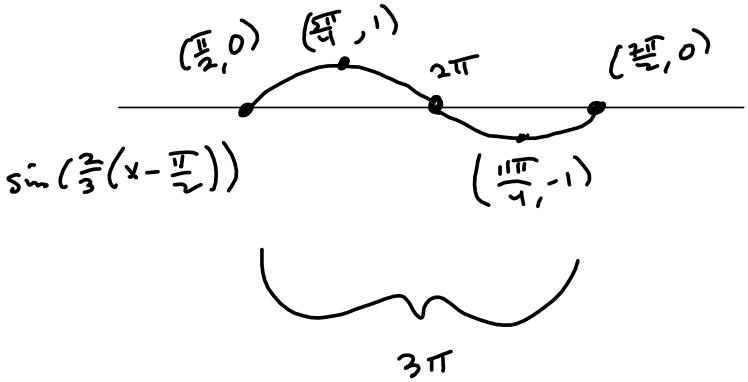
I'm pretty skeptical of these multiple-choice graphs where you're supposed to use a graphing calculator. You should be able to use technology to create graphs, but you need to have an idea of what these objects ought to look like.

https://www.desmos.com/calculator **Desmos Online Graphing Calculator**

https://www.wolframalpha.com/ **Wolfram Alpha**

$\frac{\frac{\pi}{3}}{\frac{2}{3}} = \frac{\pi}{3} \cdot \frac{3}{2} = \frac{\pi}{2}$

$f(x) = -4 \sin\left(\frac{2}{3}x - \frac{\pi}{3}\right) = -4 \sin\left(\frac{2}{3}\left(x - \frac{\pi}{2}\right)\right)$



$\frac{2}{3}x = 2\pi$ when?

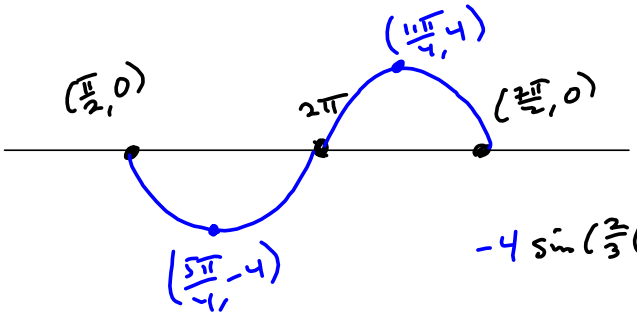
$x = \frac{6\pi}{2} = 3\pi$ = PERIOD

$\frac{\pi}{2} + 3\pi = \frac{\pi + 6\pi}{2} = \frac{7\pi}{2}$

$\frac{\frac{7\pi}{2} + \frac{\pi}{2}}{2} = \frac{\frac{8\pi}{2}}{2} = \frac{8\pi}{4} = 2\pi$

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

I left out the -4 in front:

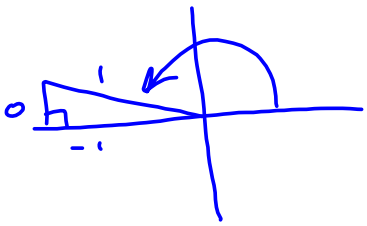


$-4 \sin\left(\frac{2}{3}\left(x - \frac{\pi}{2}\right)\right)$

28. Use a graphing utility to graph y_1 and y_2 in the interval $[-2\pi, 2\pi]$. Use the graphs to find real numbers x such that $y_1 = y_2$. (Enter your answers as a comma-separated list.)

$y_1 = \cos x$
$y_2 = -1$

$\cos(x) = -1$



$x = \pi, 3\pi, \ldots$
$x = \pm(2n-1)\pi$, $n \in \mathbb{N}$

$\mathbb{N}$ = Natural #s
$= \{1, 2, 3, 4, \ldots\}$
$\mathbb{Z}$ = Integers =
$\{0, \pm 1, \pm 2, \pm 3, \pm 4, \ldots\}$

Solution SET:
$\{\pm(2n-1)\pi \mid n \in \mathbb{N}\}$
"is in"

{People who can drink alcohol}
$= \{x \mid x \text{ is 21 or more years old}\}$

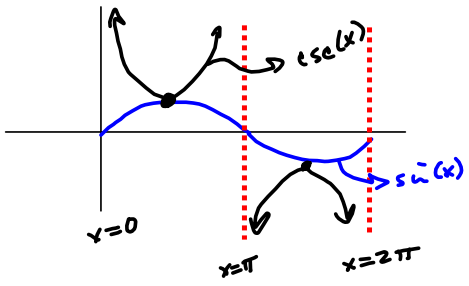
"21 or more years old" is the condition for membership, but not the set of all members.

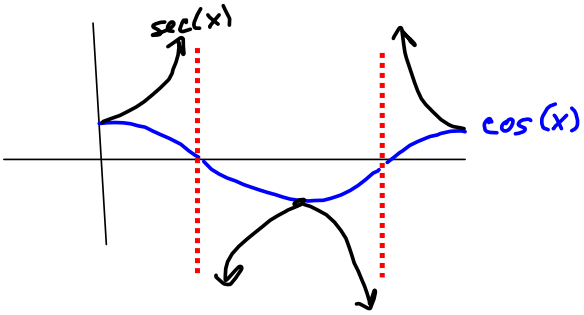
Learn to look ahead, take notes even (especially) when you don't understand something, so you're loaded for bear when you come to class!

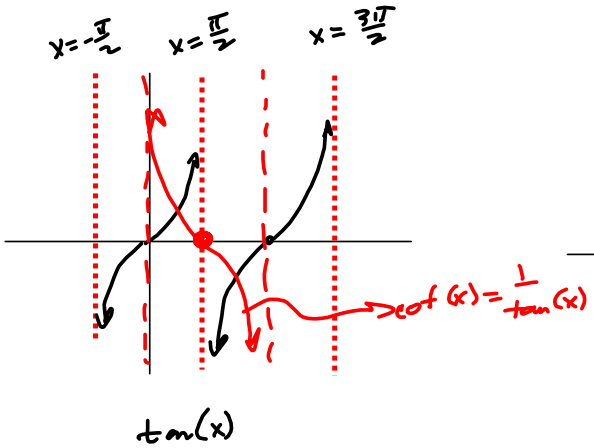
You want lecture to be the SECOND (or third) time you saw/heard something.

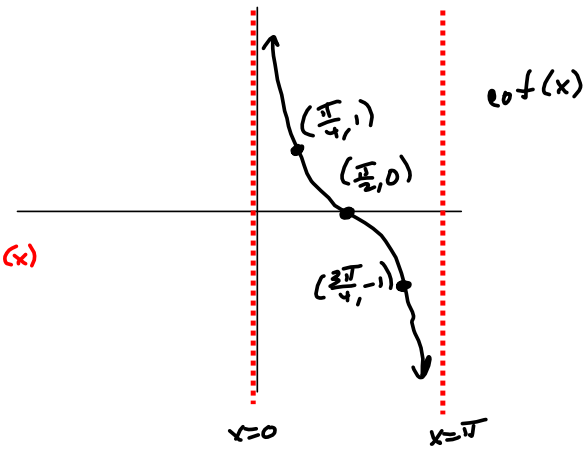
Writing is learning. Thinking is just thinking.

Writing is about REVISION. Write, revise, write, revise, ...


csc(x)
sin(x)
x=0
x=π
x=2π


sec(x)
cos(x)


x=-π/2
x=π/2
x=3π/2
cot(x)=1/tan(x)
tan(x)


cot(x)
(π/4,1)
(π/2,0)
(3π/4,-1)
x=0
x=π

Reading/Skimming for next Monday:

1.6 and 1.7. Just jot down the highlights.

Maybe one formula at the top of a page, with details to be filled in later.

Maybe just jot down the formulas.

Accustom yourself to skimming New Material.

That unit circle stuff kind of sucks.

Go to the notes from the first week of school.

I attack it differently than the book. The book wants you to memorize a bunch of crap. I want you to know about 5 triangles and then reason the rest of it out.