

Suggested Cheat Sheet for Chapters 1 and 2 on the Midterm

One-side only.

https://harryzaims.com/public_html/122/videos/chapter-02/test-2/cheat-sheet-test-2.pdf

I've inserted due dates for Writing Project #1.

Writing Project #0 is mostly a system check for uploading your written math work.

Questions? 1.1 - 1.3?

How are due dates working so far? Do I need to push things back a little?

Course Schedule has been revised. See Writing Project #1 and Written Midterm dates (before and after Spring Break, respectively).

https://harryzaims.com/public_html/122/1420-spring-24/1420-schedule-spring-24.pdf

Check the chat for the above link.

Today: Point you to resources on harryzaims.com and chew up as much of 1.2 - 1.4 as possible.

Section 1.2 - Memorize small set of right triangles:

30-60-90

45-45-90

Quadrant Angles (Degenerate Triangles)

3-4-5

1.2 is all about the UNIT CIRCLE, and it is helpful to understand the relationship between sine, cosine and points on the unit circle.

Recall: Arc length:

$s = \text{arc length}$

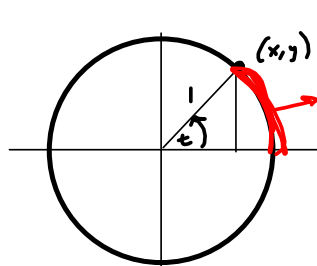
$r = \text{radius}$

$\theta = t = \text{angle (in radians)}$

$$s = r\theta$$

What does that mean for the UNIT CIRCLE?

→ NOT DEGREES!



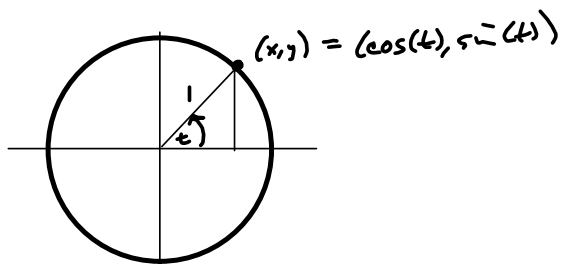
$$s = r\theta = 1\theta = \theta!$$

$2\pi = \text{circumference of the unit circle}$
 from $C = 2\pi r$, where $r = 1$.

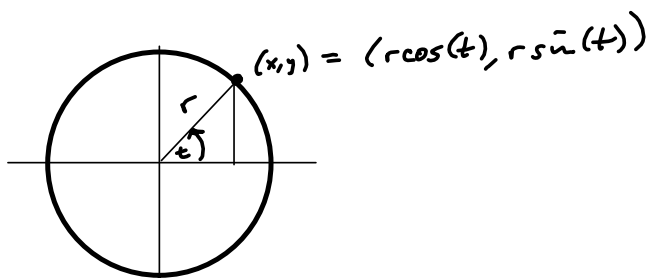
Definitions of Trigonometric Functions

Let t be a real number and let (x, y) be the point on the unit circle corresponding to t .

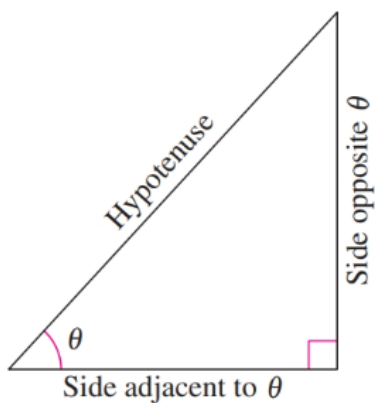
$$\begin{aligned} \sin t &= y = \frac{y}{r} & \text{but } r=1! & \cos t &= x & \tan t &= \frac{y}{x}, \quad x \neq 0 \\ \csc t &= \frac{1}{y}, \quad y \neq 0 & \sec t &= \frac{1}{x}, \quad x \neq 0 & \cot t &= \frac{x}{y}, \quad y \neq 0 \end{aligned}$$



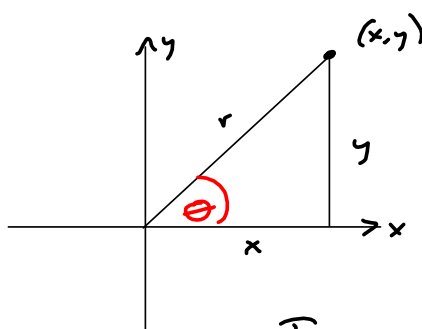
More generally:



§ 1.3 Right-angle Trigonometry (see 1st lecture.)



SOHCAHTOA



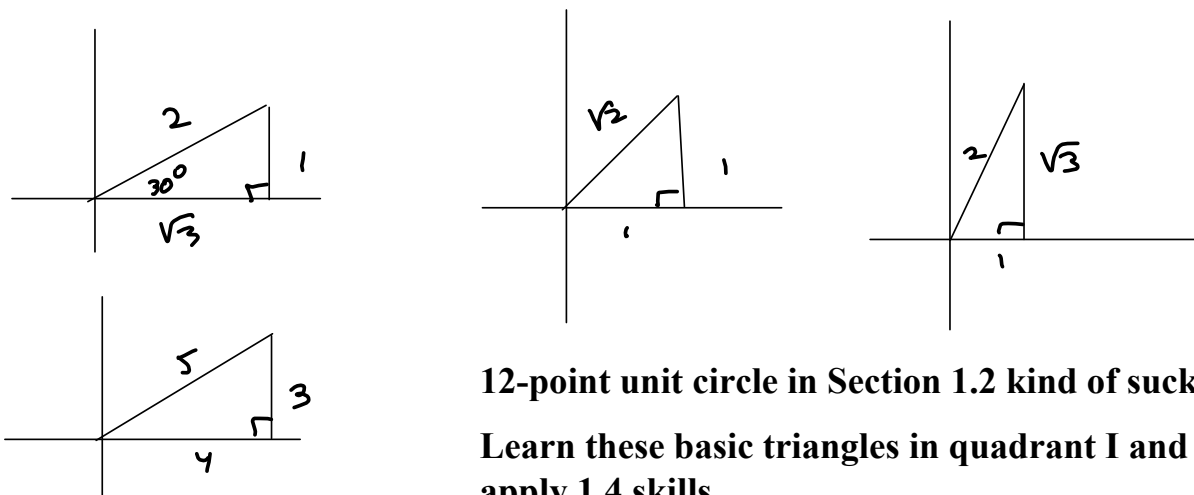
§ 1.3 is Quadrant I

$$\begin{aligned} \sin(\theta) &= \frac{y}{r} \\ \cos(\theta) &= \frac{x}{r} \\ \tan(\theta) &= \frac{y}{x} \end{aligned}$$

$$\begin{aligned} \csc(\theta) &= \frac{r}{y} \\ \sec(\theta) &= \frac{r}{x} \\ \cot(\theta) &= \frac{x}{y} \end{aligned}$$

Quadrant Angles: Angles corresponding to points on the x - or y -axes.

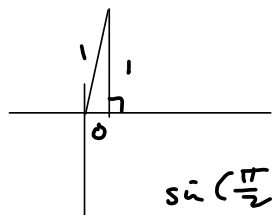
One way (my way) of representing these is with degenerate triangles.



12-point unit circle in Section 1.2 kind of sucks.

Learn these basic triangles in quadrant I and then apply 1.4 skills.

Quadrant Angles



$90^\circ = \frac{\pi}{2}$

$\sin\left(\frac{\pi}{2}\right) = \frac{y}{r} = \frac{1}{1} = 1$

$\cos\left(\frac{\pi}{2}\right) = \frac{x}{r} = \frac{0}{1} = 0$

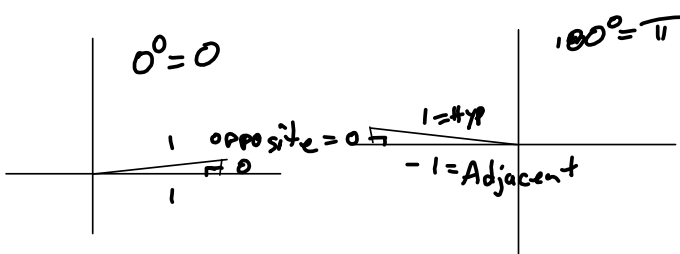
$\tan\left(\frac{\pi}{2}\right) = \frac{y}{x} = \frac{1}{0}$ Undefined!

$\csc\left(\frac{\pi}{2}\right) = 1$

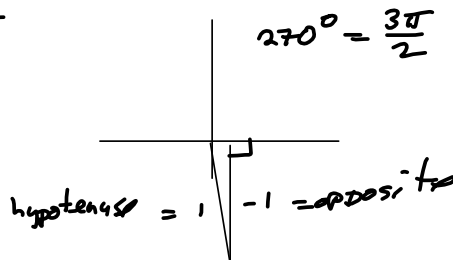
$\sec\left(\frac{\pi}{2}\right) = \frac{1}{0}$ DNE!

$\cot\left(\frac{\pi}{2}\right) = \frac{0}{1} = 0!$

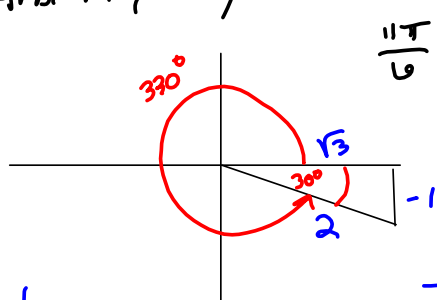
→ "Does not exist"
~~A~~



$180^\circ = \pi$



Arbitrary Angles:



$$\frac{11\pi}{6} = 330^\circ$$

Reference Angle is 30° !
 So, $30^\circ-60^\circ-90^\circ$ triangle
 in Q IV

$$\sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$$

$$\cos\left(\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

$$\tan\left(\frac{11\pi}{6}\right) = \frac{-1}{\sqrt{3}} = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$$

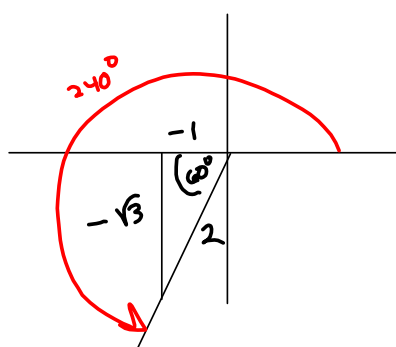
$$\csc\left(\frac{11\pi}{6}\right) = -2$$

$$\sec\left(\frac{11\pi}{6}\right) = \frac{2}{\sqrt{3}} \text{ or } \frac{2\sqrt{3}}{3}$$

$$\cot\left(\frac{11\pi}{6}\right) = -\sqrt{3}$$

1.2 can cause dain bramage, I mean "brain damage."

S1.4 Extend to all angles.



$$240^\circ - 180^\circ = 60^\circ = \text{reference angle}$$

$$\cos(-2) \approx -.4161$$

$$\text{Find } \sin\left(\frac{4\pi}{3}\right) = \frac{-\sqrt{3}}{2}$$

$$\cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$$

$$\tan\left(\frac{4\pi}{3}\right) = \frac{-\sqrt{3}}{-1} = \sqrt{3}$$

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

$$\sec\left(\frac{4\pi}{3}\right) = -2$$

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

$$\left(\frac{4\pi}{3}\right) \left(\frac{180^\circ}{\pi}\right) = \frac{4(60)^\circ}{1} = 240^\circ$$

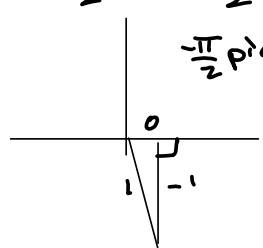
$\cos(-2)$ $-.4161468365$

"Use its period as an aid?!"

Sine and cosine are periodic functions, with period 2π

Tangent is periodic with period π

$$\cos\left(-\frac{9\pi}{2}\right) = \cos\left(2(2\pi) - \frac{\pi}{2}\right) = \cos\left(-\frac{\pi}{2}\right)$$

$$-\frac{9\pi}{2} = -\frac{8\pi}{2} - \frac{1\pi}{2} = -\frac{8\pi}{2} - \frac{\pi}{2} = \underbrace{-4\pi}_{\text{Throw me out!}} - \frac{\pi}{2} = 2(-2\pi) - \frac{\pi}{2}$$


$$\cos\left(-\frac{\pi}{2}\right) = \frac{0}{1} = 0!$$

calculator for cot, sec, & csc:

$$\cot(-1.2) = 1 / \tan(-1.2)$$

```
1/tan(-1.2)
-.3887795694
tan(-1.2)
-2.572151622
1/Ans
-.3887795694
■
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When you don't see degrees, it's radians!

Make sure your calculator is in the right mode.

11. $\cos(t) = \frac{3}{4}$. What's $\cos(\pi - t)$?

