Calculus 1- trig, log, and exponential functions
Tuesday, September 9, 2025 3:00 PM

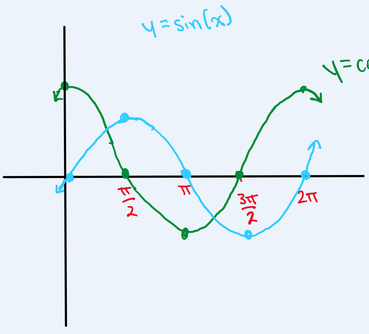
Trig, Log + Exponential Functions

- The chord function (the first trig function)

* Test schedule - Corrections!
- Test 1: Sept 26
- Test 4: Nov 14

Major Trig Functions

- sin(x)
- cos(x)
- tan(x) → $\frac{\sin(x)}{\cos(x)}$
- sec(x)
- csc(x) → $\frac{1}{\cos(x)}$
- cot(x)



Trig Identities

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

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

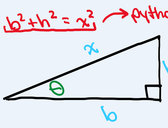
$\cos(2x) = \cos^2 x - \sin^2 x$
$= 1 - 2\sin^2(x)$
$= 2\cos^2(x) - 1$
} double angle formula for cos (will need occasionally)

$\sin(2x) = 2\sin(x)\cos(x)$ } double angle formula for sin

$\tan(2x) = \frac{\sin(2x)}{\cos(2x)} = \frac{2\sin(x)\cos(x)}{\cos^2(x) - \sin^2(x)}$

opposite = opp.
adjacent = adj.
hypotenuse = hyp.

$b^2 + h^2 = x^2$ → Pythagorean theorem

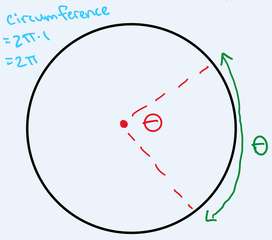


$\sin\theta = \frac{h}{x}$ (opp. / hyp.) $\quad \tan(\theta) = \frac{h}{b}$ (opp. / adj.)

$\cos(\theta) = \frac{b}{x}$ (adj. / hyp.)

ex:
$\sec(x) = \frac{1}{\cos(\theta)} = \frac{1}{b/x} = \frac{x}{b}$

Radian Measure → every angle WILL be in radian measure unless otherwise stated



$360° = 2\pi$ radians

$90° = \frac{360°}{4} = \frac{2\pi}{4} = \frac{\pi}{2}$

is a right angle!

Special Values

$\sin(90°) = \sin\left(\frac{\pi}{2}\right) = 1$

$\cos(90°) = \cos\left(\frac{\pi}{2}\right) = 0$

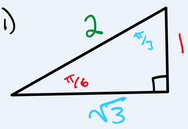
$\sin(0) = 0, \cos(\theta) = 1$

ex. ⇒ $\cos\left(\frac{\pi}{4}\right) = \cos(45°) = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$ $\left(\sqrt{2}\right)^2$

ex. ⇒ $\sin\left(\frac{\pi}{4}\right) = \sin(45°) = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$

↳ Special Triangles

1)



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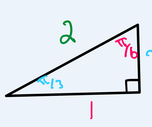

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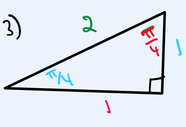


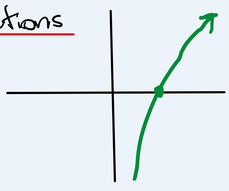
$\frac{\pi}{6} = 30°$ $\quad \frac{\pi}{3} = 60°$

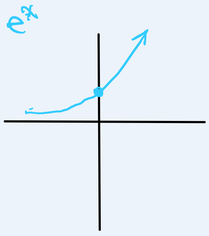
↳ ex: $\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$ (opp. / hyp.)

Logs + Exponential Functions

natural logs: $\ln(x)$

$\ln(e) = 1$





If $a > 0$...

$\log_a(x) = \frac{\ln(x)}{\ln(a)}$ → natural logarithm of "x"; → natural logarithm of "a"

$a^x = e^{\ln(a)\cdot x}$

$\log_a(a^x) = x$

$e^{\ln(a)} = a$