Graphs of Secant, Cosecant, Tangent, and Cotangent
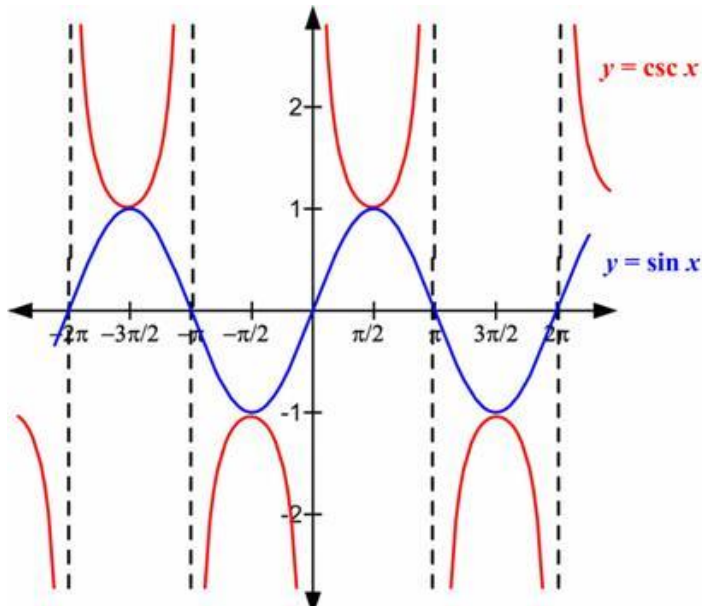
Graphs of Secant and Cosecant

Cosecant:

Cosecant is the reciprocal of sine → if sine has a max value of 1, cosecant will have a min value at 1; if sine has a min value of -1, cosecant will have a max value at -1, etc

← vertical asymptotes (dashed lines) where the sine function touches the x axis

Secant:

Secant is the reciprocal of cosine → if cosine has a max value of 1, secant will have a min value at 1; if cosine has a min value of -1, secant will have a max value at -1, etc
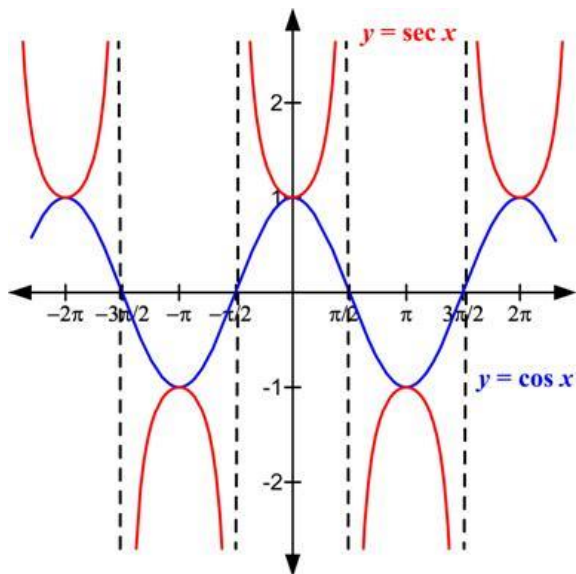
← vertical asymptotes (dashed lines) where the sine function touches the x axis

Tangent:

Characteristics of the graph of y=tan(x):

- There are *vertical asymptotes* wherever tangent is undefined [wherever $\cos(x) = 0$ since $\tan(x) = \sin(x)/\cos(x)$] ← graph will never touch/cross these asymptotes

- The *period* is π (this is because if you look at the unit circle, the values of tangent repeat themselves every half revolution, or π revolutions)

- *Domain:* all real numbers except where the asymptotes occur
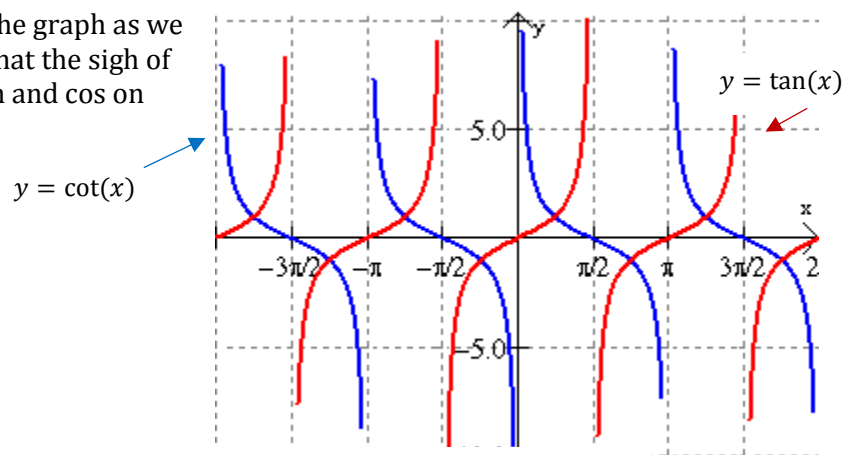
- *Range:* all real numbers

- *No amplitude*
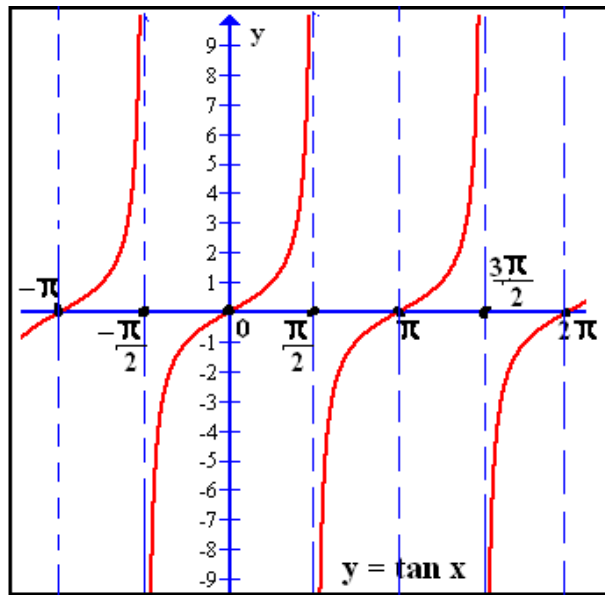
- Between 0 and $\frac{\pi}{2}$ sine and cosine are both positive → tangent is positive
- Between $\frac{\pi}{2}$ and π sine is positive but cosine is negative → tangent is negative
- Between π and $\frac{3\pi}{2}$ sine is negative and cosine is negative → tangent is positive
- Between $\frac{3\pi}{2}$ and 2π sine is negative and cosine is positive → tangent is negative|

Cotangent:

Cotangent is the reciprocal of tangent → While the graph of y=tan(x) has vertical asymptotes where cos(x)=0, y=cot(x) has vertical asymptotes where sin(x)=o [since $\cot(x) = \cos(x)/\sin(x)$]

Same rules apply to construct the graph as we did y=tan(x) → check to see what the sigh of cot is based upon the sign of sin and cos on that interval (quadrant)

$y = \cot(x)$

$y = \tan(x)$

- Between 0 and $\frac{\pi}{2}$ sine and cosine are both positive → cotangent is positive
- Between $\frac{\pi}{2}$ and π sine is positive but cosine is negative → cotangent is negative
- Between π and $\frac{3\pi}{2}$ sine is negative and cosine is negative → cotangent is positive
- Between $\frac{3\pi}{2}$ and 2π sine is negative and cosine is positive → cotangent is negative