7.2 Graphs of other Trig functions

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

Zeros of sine/cosine are the VA of cosecant/secant.

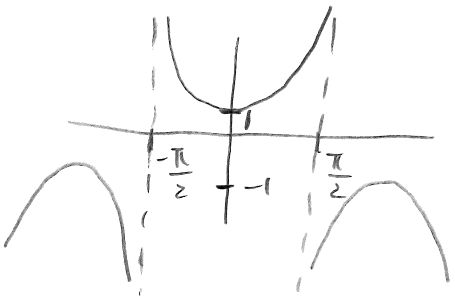
For $\sec(x)$: $\cos(x) = 0$ at $\frac{\pi}{2} + k\pi$

So, VA at $x = \frac{\pi}{2} + k\pi$

$\Rightarrow$ Domain is all x except $\frac{\pi}{2} + k\pi$.

Period: still 2π

Range: $(-\infty, -1) \cup (1, \infty)$

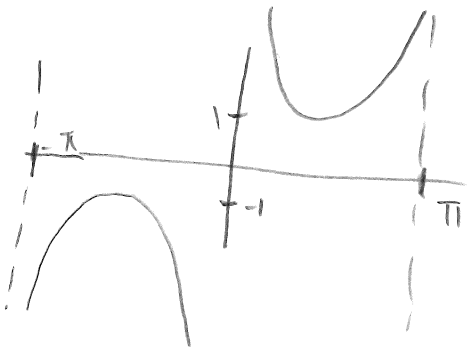


For $\csc(x)$: $\sin(x) = 0$ at $k\pi$

VA at $x = k\pi$

Period: 2π

Range: $(-\infty, -1) \cup (1, \infty)$



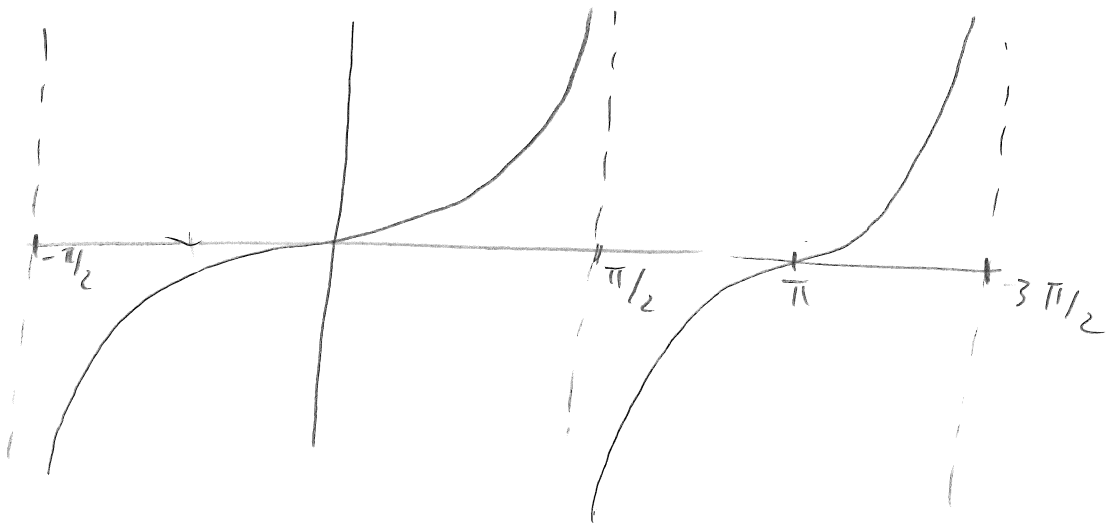
Note: period of $\sec Bx$ and $\csc Bx$ is still $\frac{2\pi}{|B|}$

Local max of -1 and local min of 1 for both.

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

VA when $\cos(x) = 0$ (i.e. $x = \frac{\pi}{2} + k\pi$)

zeros when $\sin(x) = 0$ (i.e. $x = k\pi$)



Domain: all x except $\frac{\pi}{2} + k\pi$

period: π

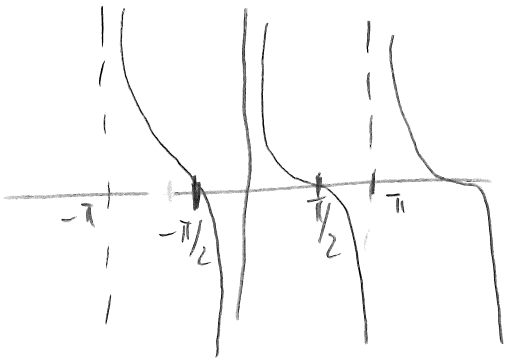
range: $(-\infty, \infty)$

No local extrema.

$\cot(x) = \dfrac{\cos(x)}{\sin(x)}$

VA when $\sin(x) = 0$ (i.e. $x = k\pi$)

zeros when $\cos(x) = 0$ (i.e. $x = \frac{\pi}{2} + k\pi$)



Domain: all x except $k\pi$

period: π

range: $(-\infty, \infty)$, no local extrema

period of $\cot Bx$, $\tan Bx$ is $\dfrac{\pi}{|B|}$

Ex) Find $\tan \dfrac{87\pi}{4}$

$\dfrac{87\pi}{4} = \dfrac{88\pi}{4} - \dfrac{\pi}{4} = 22\pi - \dfrac{\pi}{4}$

So, $\tan\left(\dfrac{87\pi}{4}\right) = \tan\left(-\dfrac{\pi}{4}\right) = -1$

B/c, by reference angles, know that

$\cos\left(-\dfrac{\pi}{4}\right) = \dfrac{\sqrt{2}}{2}$, $\sin\left(-\dfrac{\pi}{4}\right) = -\dfrac{\sqrt{2}}{2}$