MATH 11022: More Trig Graphs

Example 1: Graph one cycle of $y = \tan x$.



- One cycle is from $-\frac{\pi}{2} < x < \frac{\pi}{2}$.
- The domain of $f(x) = \tan x$ is $\{x \mid x \neq \frac{\pi}{2} + n\pi, n = 0, \pm 1, \pm 2, \dots\}$.
- The graph of $y = \tan x$ has vertical asymptotes at $x = \frac{\pi}{2} + n\pi, n = 0, \pm 1, \pm 2, \dots$
- For all x in its domain, $-\infty < \tan x < \infty$.

Example 2: Graph one cycle of the following functions.

(a)
$$y = \tan(2x)$$

(b)
$$y = -\tan(\frac{1}{8}x)$$

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

Example 3: Graph one cycle of $y = \csc x$.



- One cycle is from $0 < x < \pi$ and $\pi < x < 2\pi$.
- The domain of $f(x) = \csc x$ is $\{x \mid x \neq n\pi, n = 0, \pm 1, \pm 2, \dots\}$.
- The graph of $y = \csc x$ has vertical asymptotes at $x = n\pi, n = 0, \pm 1, \pm 2, \ldots$
- For all x in its domain, $\csc x \le -1$ or $1 \le \csc x$. That is, $|\csc x| \ge 1$.

Example 4: Graph one cycle of $y = \sec x$.



- One cycle is from $0 \le x < \frac{\pi}{2}, \frac{\pi}{2} < x < \frac{3\pi}{2}$, and $\frac{3\pi}{2} < x \le 2\pi$.
- The domain of $f(x) = \sec x$ is $\{x \mid x \neq \frac{\pi}{2} + n\pi, n = 0, \pm 1, \pm 2, ...\}.$
- The graph of $y = \sec x$ has vertical asymptotes at $x = \frac{\pi}{2} + n\pi, n = 0, \pm 1, \pm 2, \dots$
- For all x in its domain, $\sec x \le -1$ or $1 \le \sec x$. That is, $|\sec x| \ge 1$.

Example 5: Graph one cycle of the following functions.

(a) $y = 2 \sec(2x - \pi)$

(b) $y = 2\csc(\frac{1}{2}x - \frac{\pi}{4})$

Example 6: Graph one cycle of $y = \cot x$.



- One cycle is from $0 < x < \pi$.
- The domain of $f(x) = \cot x$ is $\{x \mid x \neq \pi + n\pi, n = 0, \pm 1, \pm 2, ...\}$.
- The graph of $y = \cot x$ has vertical asymptotes at $x = \pi + n\pi, n = 0, \pm 1, \pm 2, \ldots$
- For all x in its domain, $-\infty < \cot x < \infty$.

Example 7: Graph one cycle of the following functions.

(a) $y = \cot(3x)$

(b)
$$y = -\cot\left(\frac{1}{8}x\right)$$