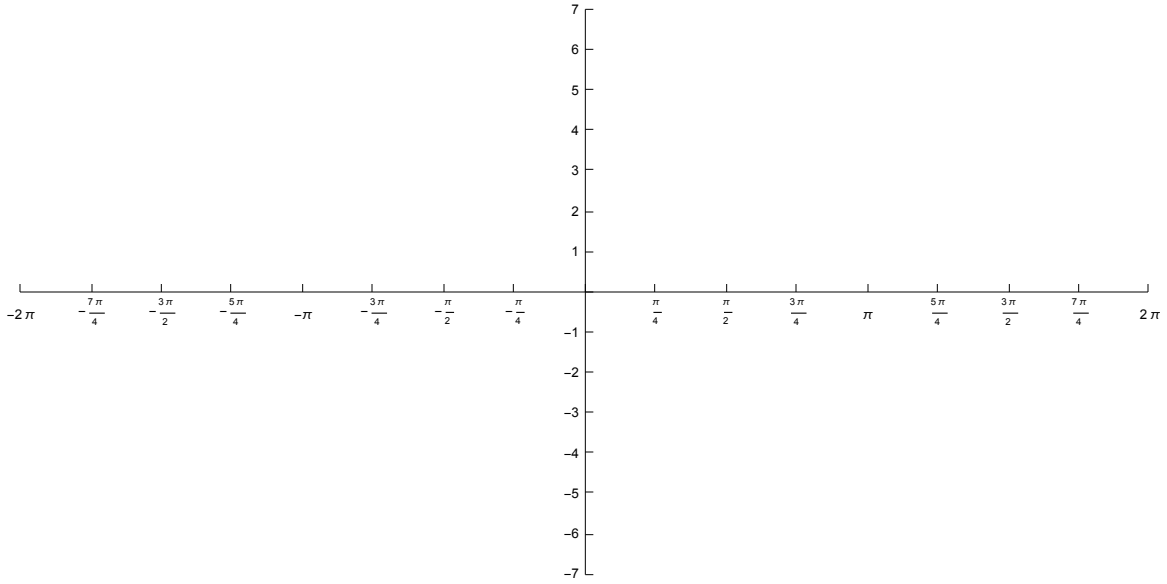
5.4 More Trigonometric Graphs: tan(*t*), csc(*t*), sec(*t*), and cot(*t*)

Objectives: (1) Graph tangent, (2) graph the reciprocal functions: cosecant, secant, and cotangent.

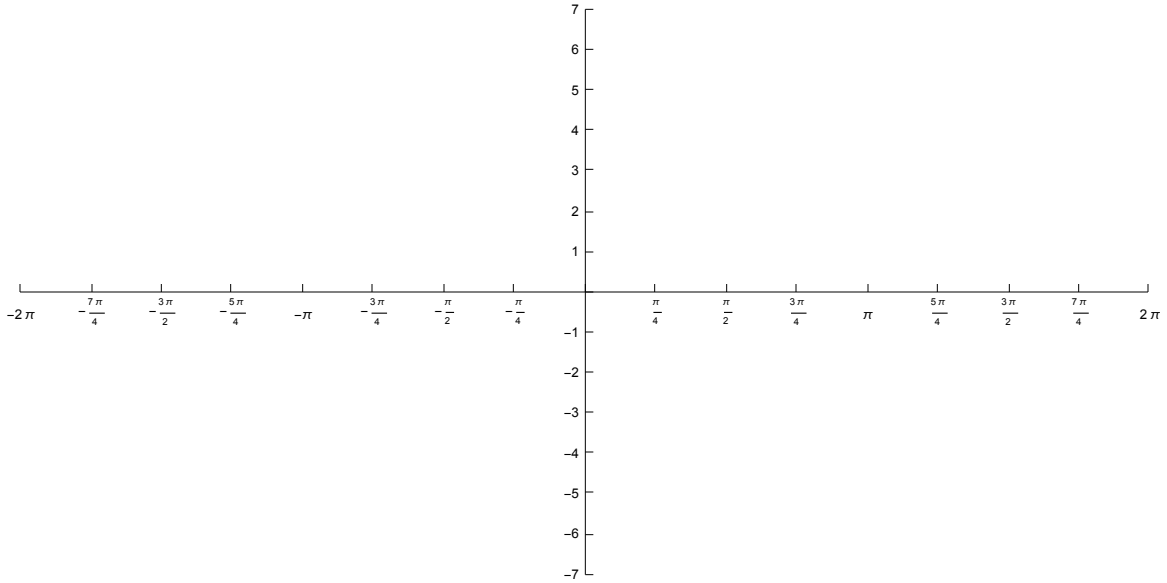
The Tangent Function

Recall the tangent can be written as $\tan(t) = \frac{\sin(t)}{\cos(t)}$, and has a domain of all real numbers except multiples of $\frac{\pi}{2}$ and $\frac{3\pi}{2}$ (where $\cos(t) = 0$). At these values, $\sin(t) \to 1$ and $\cos(t) \to 0$. Therefore, the tangent has *vertical asymptotes* whenever $\cos(t) = 0$.



Transformations of Tangent

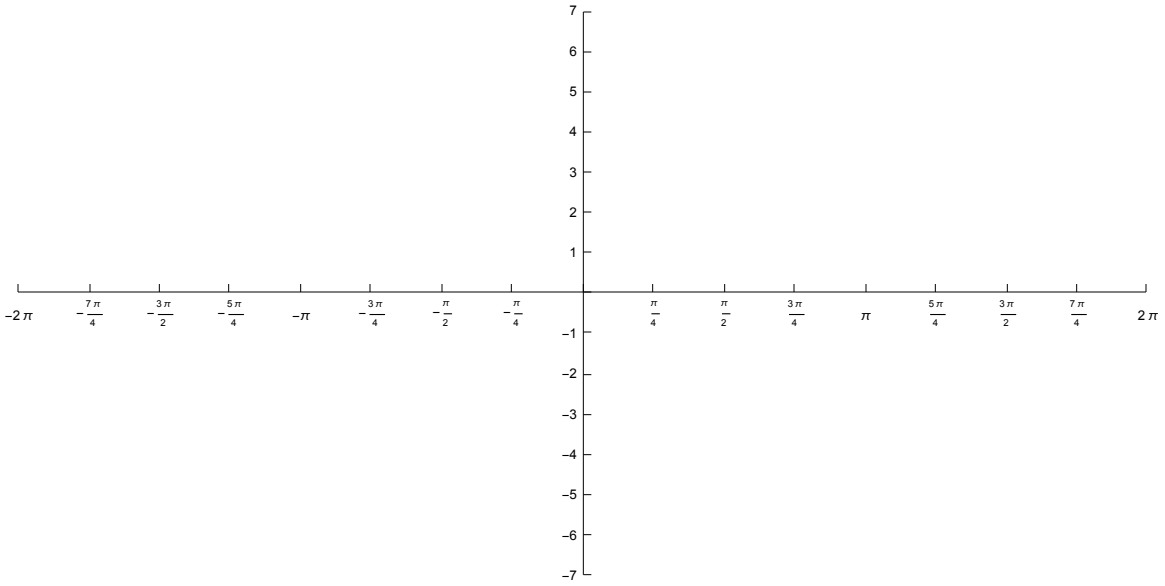
Example 2 Make an accurate sketch of the functions $f(t) = \tan\left(\frac{t}{2} + \frac{\pi}{2}\right)$



Graphs of csc(*t*), sec(*t*), cot(*t*)

When graphing the reciprocal functions, think about what the associated functions (sine, cosine, tangent) look like, and what the reciprocal of these function values are (very similar to graphing the tangent function.)

Example 3 Make sketch of the function $y = 3\sec(2t)$.



Example 4 Make sketch of the function $y = 2\csc\left(t - \frac{\pi}{4}\right)$.