

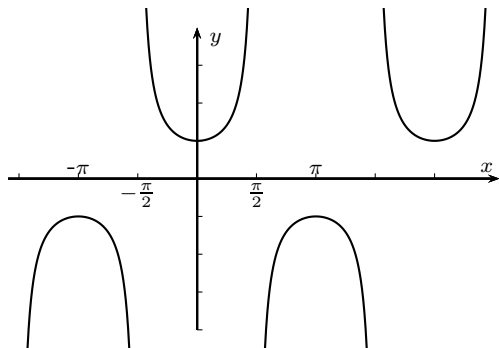
Precalculus, Section 6.5, #40
 Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions

Graph the function. Be sure to label key points and show a least two cycles. Use the graph to determine the domain and range of the function.¹

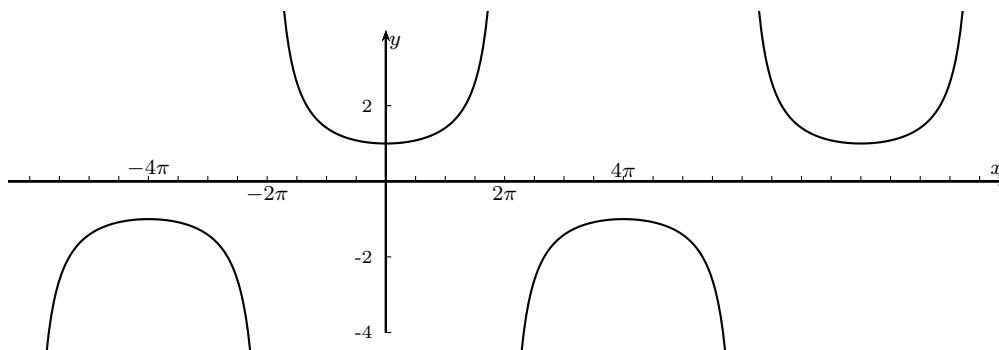
$$y = 3 \sec\left(\frac{1}{4}x\right) - 2$$

Let's graph this function using translations of the parent function $y = \sec(x)$.

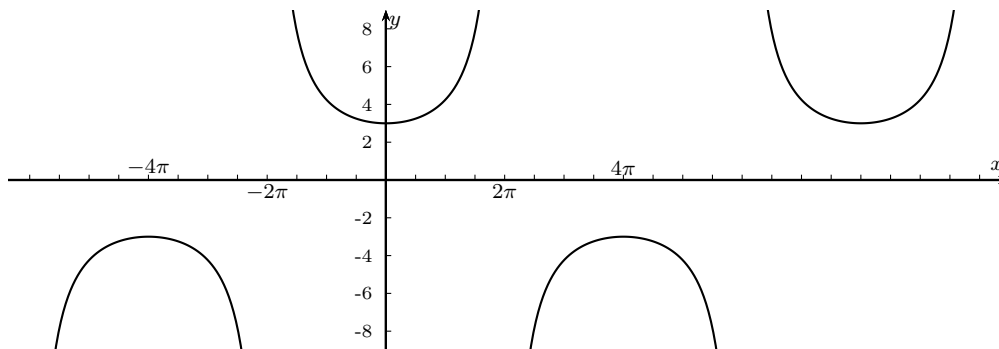
Here are two cycles of $y = \sec(x)$:



The $\frac{1}{4}x$ makes a horizontal stretch by a factor of 4, so all the x -values are multiplied by 4. Here is the graph of the same two cycles after the horizontal stretch. $y = \sec\left(\frac{1}{4}x\right)$:



The $3\sec \dots$ makes a vertical stretch by a factor of 3, so all the y -values are multiplied by 3. Here is the graph of the same two cycles after the vertical stretch. $y = 3 \sec\left(\frac{1}{4}x\right)$:



¹Sullivan, *Precalculus: Enhanced with Graphing Utilities*, p. 419, #40.

Precalculus
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Finally, the $\dots - 2$ makes a vertical translation of -2, so all the graph moves down 2 units. Here is the graph of the same two cycles after the vertical translation. $y = 3 \sec\left(\frac{1}{4}x\right) - 2$:

