Author John J Weber III, PhD | **email** John.Weber@gpc.edu
Updated 17 January 2015 | **Page** 1/2
URL: http://www.jjw3.com/r/sec.pdf

jjw3.com

1 Secant Function

1.1 Graph

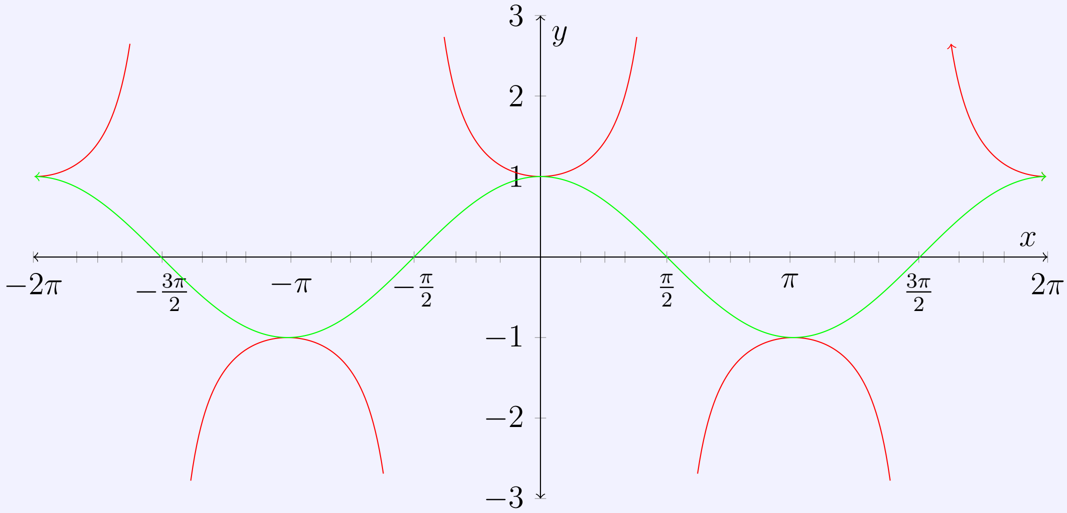

Figure 1: $f(x) = \sec(x)$ [red], $g(x) = \cos(x)$ [green]

1.2 Properties of Graph

- domain: $x \neq (2n+1)\pi$, $n \in \mathbb{Z}$
- range: $y \in (-\infty, -1] \cup [1, \infty)$
- x-intercepts: none
- y-intercept: $y = 1$
- period: 2π
- vertical asymptotes: $x = (2n+1)\pi$, $n \in \mathbb{Z}$
- horizontal asymptotes: none
- symmetry: y-axis, i.e., even function

1.3 Unit Circle

$\sec(\theta)$ corresponds to the $\dfrac{1}{x}$ on the unit circle. In the xy-plane, $x < 0$ in Quadrant II and Quadrant III.

$x < 0$ means x is negative.

1.4 Mathematica Code

1.4.1 Angles in Degrees

Sec[x Degree], e.g., Sec[30 Degree].

All *Mathematica* functions start with an upper case letter and have square brackets for arguments.

1.4.2 Angles in Radians

Sec[x], e.g., Sec[Pi/6].

2 Inverse Secant Function

2.1 Graph

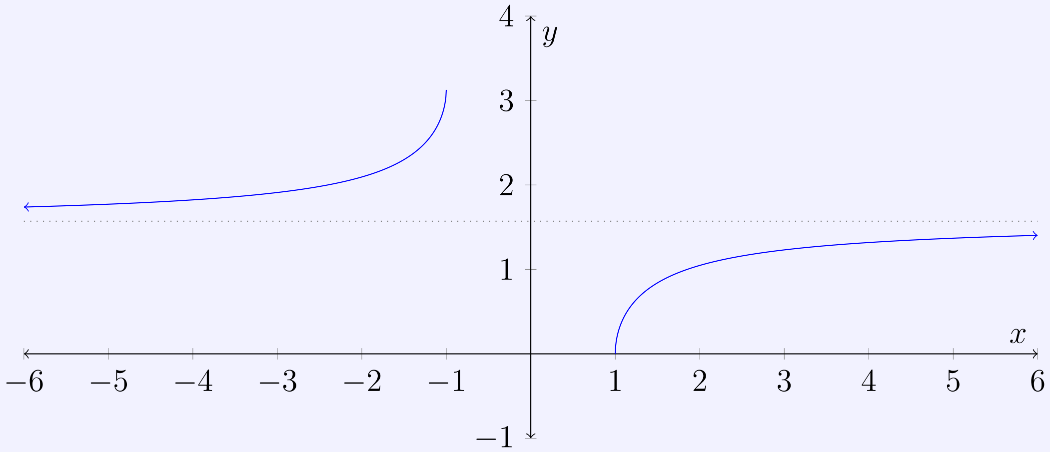

Figure 2: $f(x) = \sec^{-1}(x)$

$\sec^{-1}(x) \neq \dfrac{1}{\sec(x)}$

2.2 Properties

- domain: $x \in (-\infty, -1] \cup [1, \infty)$
- range: $y \in \left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$
- x-intercepts: $x = 1$
- y-intercept: none
- period: n/a
- vertical asymptotes: none
- horizontal asymptotes: $y = \frac{\pi}{2}$
- symmetry: none

The domain of the inverse is the same as the range of $\sec(x)$.

To find the inverse, the domain of $\sec(x)$ must be restricted to $\left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$ to make the function 1-to-1.

2.3 Mathematica Code

2.3.1 To Obtain Angles in Radians

ArcSec[x], e.g., ArcSec[2].

Mathematica returns on the standard reference angle.

2.3.2 To Obtain Angles in Degrees

ArcSec[x]/Degree//N, e.g., ArcSec[2]/Degree//N.