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1 Cosecant Function

1.1 Graph

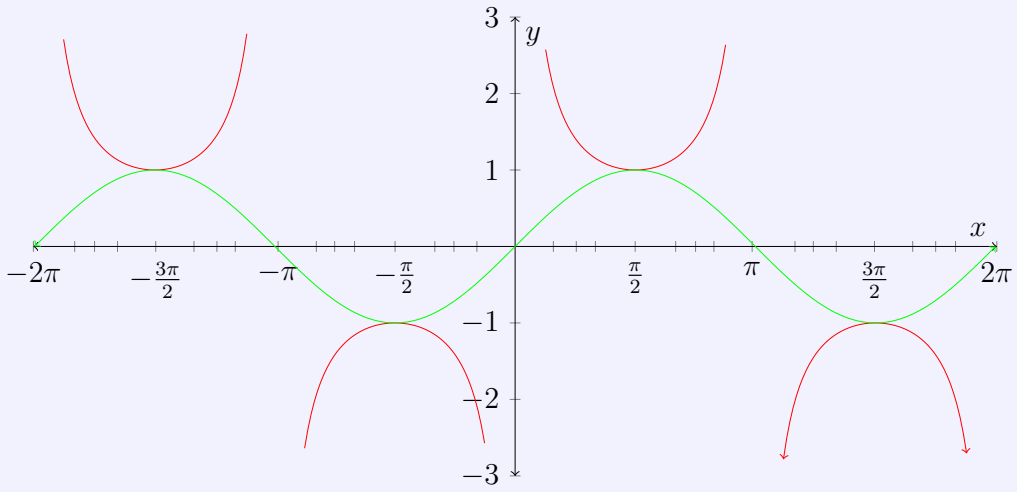

Figure 1: $f(x) = \csc(x)$ [red], $g(x) = \sin(x)$ [green]

1.2 Properties of Graph

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

1.3 Unit Circle

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

$y < 0$ means y is negative.

1.4 Mathematica Code

1.4.1 Angles in Degrees

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

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

1.4.2 Angles in Radians

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

2 Inverse Cosecant Function

2.1 Graph

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

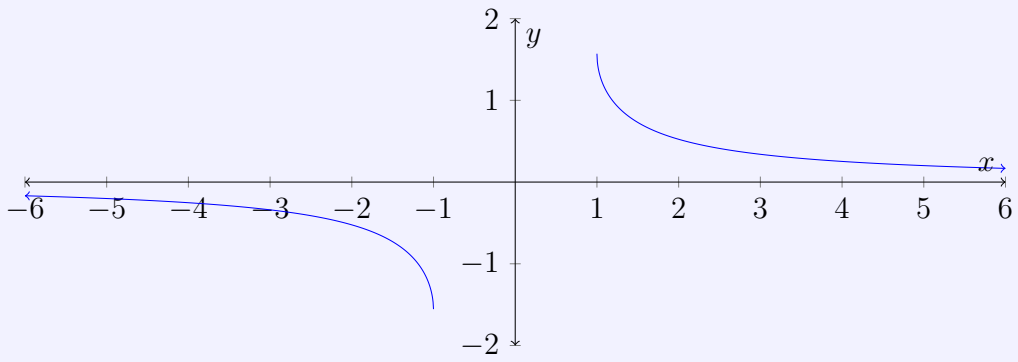

Figure 2: $f(x) = \csc^{-1}(x)$

2.2 Properties

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

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

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

2.3 Mathematica Code

2.3.1 To Obtain Angles in Radians

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

Mathematica returns on the standard reference angle.

2.3.2 To Obtain Angles in Degrees

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