Objective: Develop Basic Identities

Identities and Domain of Validity

Consider the following equation: \( \frac{x^2 - 4}{x - 2} = \frac{(x + 2)(x - 2)}{x - 2} = x + 2 \).

The equation \( \frac{x^2 - 4}{x - 2} = x + 2 \) is called an identity. An identity is an equation that is true for all numbers that are in the domain of both sides of the equation, in this case all real numbers except \( x = 2 \).

This is called the domain of validity for the equation.

Basic Trigonometric Identities.

You know from the unit circle that \( \sin \theta = y \) and \( \cos \theta = x \). And since \( \tan \theta = \frac{y}{x} \) we have the identity \( \tan \theta = \frac{\sin \theta}{\cos \theta} \).

Since \( \cos \theta = 0 \) for all \( \theta = \frac{\pi}{2} \pm n \cdot \pi \), the domain of validity is all real numbers except \( \theta = \frac{\pi}{2} \pm n \cdot \pi \).

You can see from the graph of \( y = \tan x \), that tangent is undefined at those values for \( x \).