

Exercise 6

Find the domain of the function.

$$g(x) = \frac{1}{1 - \tan x}$$

Solution

Start by writing tangent in terms of sine and cosine.

$$g(x) = \frac{1}{1 - \frac{\sin x}{\cos x}}$$

The domain of a fraction is found by requiring the denominator to not be zero. Since there are two fractions, chain the domains together with the logical operator, “and.”

$$\begin{array}{lll} 1 - \frac{\sin x}{\cos x} \neq 0 & \text{and} & \cos x \neq 0 \\ 1 - \tan x \neq 0 & \text{and} & \cos x \neq 0 \\ \tan x \neq 1 & \text{and} & \cos x \neq 0 \\ x \neq \frac{\pi}{4} + n\pi & \text{and} & x \neq \frac{\pi}{2} + n\pi \end{array}$$

n is an integer here: $n = 0, \pm 1, \pm 2, \dots$ Therefore, the domain is

$$\left\{ x \mid x \neq \frac{\pi}{4} + n\pi, x \neq \frac{\pi}{2} + n\pi, n \in \mathbb{Z} \right\}.$$