Find the domain of the function

\[ y = \frac{1}{\sin x - \frac{1}{2}}, \]

i.e., the set of real numbers \( x \) for which the function is defined.

**Solution:**
For this function to be defined, we have to have that the denominator is not zero, i.e.,

\[ \sin x \neq \frac{1}{2} \]

This is achieved if and only if

\[ x \neq \frac{\pi}{6} + k \cdot 2\pi \]

and

\[ x \neq \frac{5\pi}{6} + k \cdot 2\pi, \]

for all \( k \in \mathbb{Z} \).

Thus we have that the domain of the function \( y \) is given by

\[ \text{Domain} (y) = \left\{ x : x \neq \frac{\pi}{6} + k \cdot 2\pi, x \neq \frac{5\pi}{6} + k \cdot 2\pi \text{ for all } k \in \mathbb{Z} \right\}. \]

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