Trigonometric Restrictions Practice

1. The restrictions on the expression $\frac{\sin x}{\cos x - 1}$ are

   A) x ≠ $90^0 + 180^0n$
   B) x ≠ $270^0 + 180^0n$
   C) x ≠ 360^0n
   D) x ≠ $180^0 + 90^0n$

Use the following information to answer the next question.

Sandy was asked to simplify $\frac{tan\theta sin\theta}{sin\theta}$. She correctly answered that it is equal to $sin\theta$.

2. To go along with her simplification, the restrictions are

   A) $x \neq \frac{\pi}{2}n$
   B) $x \neq \frac{\pi}{2} + \pi n$
   C) $x \neq \pi n$
   D) $x \neq \frac{3\pi}{2} + \pi n$

3. The restrictions, in degrees for $\sec^2\theta - \sin^2\theta = \cos^2\theta + \tan^2\theta$ can be written in the form $\theta \neq K^0 + M^0n$, where $n \in I$. The **sum** of K and M is _____.

4. One of the restrictions for $\frac{tan\theta}{cos\theta - 1}$ is $\theta \neq \frac{3\pi}{2}$. Explain why this is a restriction.

Use the following information to answer the next question.

Consider the following statements, within the domain $\{x|0 \leq \theta \leq 2\pi\}$, with respect to

$$\frac{sin\theta+1}{cos^2\theta}$$

Statement 1	The first positive restriction is $x \neq \frac{\pi}{2}$
Statement 2	The first positive restriction is $x \neq \pi$
Statement 3	The first positive restriction is $x \neq \frac{3\pi}{2}$
Statement 4	The first positive restriction is $x \neq 2\pi$

5. The correct statement is

A) 1 B) 2 C) 3 D) 4

6. The restrictions, stated in degrees, for the trigonometric expression tan x + csc x are

A) $x \neq 90^0n, n \in I$
B) $x \neq 180^0n, n \in I$
C) $x \neq 90^0 + 180^0n, n \in I$
D) $x \neq 180^0 + 360^0n, n \in I$

7. The restrictions for $\frac{(cos\theta)(sin\theta)}{cos\theta+K}$ are $x \neq \pi + 2\pi n, n \in I$. The value of K is ____.

8. Determine the restrictions, in degrees, for the trigonometric identity $\frac{sec\theta+1}{sec\theta-1} + \frac{cos\theta+1}{cos\theta-1} = 0$.

Trigonometric Restrictions Practice Solutions

1. The restrictions on the expression $\frac{\sin x}{\cos x - 1}$ are

   A) $x \neq 90^0 + 180^0 n$
   B) $x \neq 270^0 + 180^0 n$
   C) $x \neq 360^0 n$
   D) $x \neq 180^0 + 90^0 n$

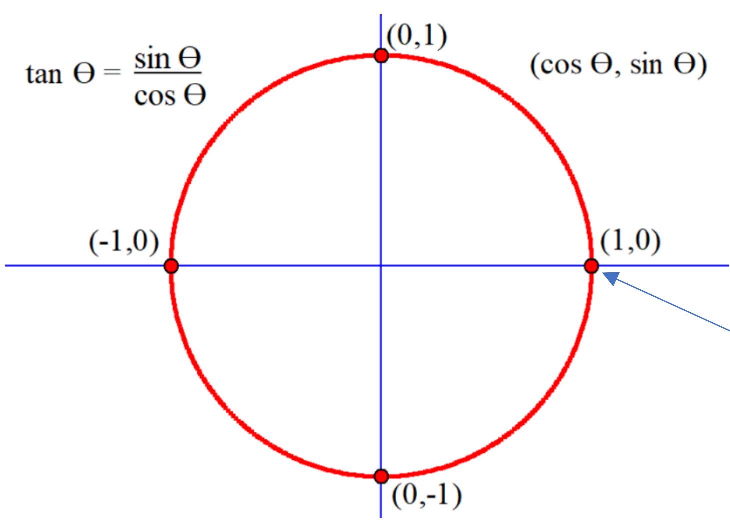
Solution

We do not have to be concerned about the numerator because there is no way to write sin x in fractional form – thus no denominator other than 1.

Since division by zero is undefined, the denominator, cos x – 1, cannot be equal to zero. We set it equal to zero and find the value of x (which remember is the angle measure).

$\cos x - 1 = 0$

$\cos x = 1$



The first positive value for x is 360^0. This value will repeat itself every full rotation around the circle, or every 360^0. The way to describe the infinite number of restrictions is $x \neq 360^0 n$

The correct answer is C.

Use the following information to answer the next question.

Sandy was asked to simplify $\frac{tan\theta sin\theta}{sin\theta}$. She correctly answered that it is equal to $sin\theta$.

2. To go along with her simplification, the restrictions are

$A)\ x \neq \frac{\pi}{2}n$

$B)\ x \neq \frac{\pi}{2} + \pi n$

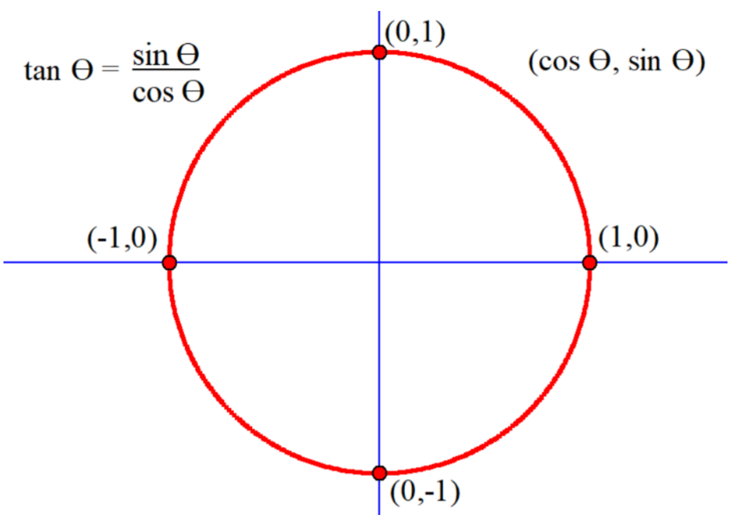
$C)\ x \neq \pi n$

$D)\ x \neq \frac{3\pi}{2} + \pi n$

Solution

The restrictions need to be determined prior to simplification.

We have two areas of concern. The denominator, sinθ, cannot be equal to zero. Secondly, since a part of the numerator, i.e., tanθ can be written in fractional form as $\frac{sin\theta}{cos\theta}$, we know that cos$\theta$ also cannot be equal to zero.



A ratio of 0 for either cos or sin will occur at $\frac{\pi}{2}, \pi, \frac{3\pi}{2}, and\ 2\pi$. The first positive restriction is $\frac{\pi}{2}$, and then repeats itself every $\frac{\pi}{2}$. To state the general restriction, or all the infinite possibilities, it is written as

$x \neq \frac{\pi}{2}n.$

The correct answer is A.

3. The restrictions, in degrees for $\sec^2\theta - \sin^2\theta = \cos^2\theta + \tan^2\theta$ can be written in the form $\theta \neq K^0 + M^0 n$, where $n \in I$. The **sum** of K and M is _270_.

Solution

Although there are no distinctive visible denominators, some of these terms can be written in fractional form. The equation could be written as:

$$\frac{1}{cos^2\theta} - sin^2\theta = cos^2\theta + \frac{sin^2\theta}{cos^2\theta}$$

Therefore, $cos^2\theta \neq 0$

Solve $cos^2\theta = 0$ to determine the values that θ cannot be equal to.

Take the square root both sides.

$cos\theta = 0$

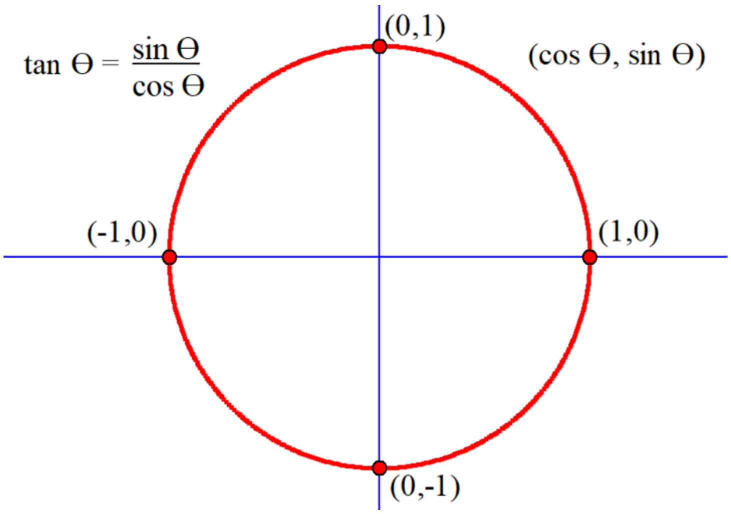
Thus the restriction is
$cos\theta \neq 0$

From the diagram below, $\cos 90^0 = 0$ and $\cos 270^0$ are both equal to zero.

To state the general restriction, $\theta \neq 90^0 + 180^0 n, n \in I$.

The value of K is 90 and the value of M is 180.

The sum of M and K is 270.



4. One of the restrictions for $\frac{tan\theta}{cos\theta - 1}$ is $\theta \neq \frac{3\pi}{2}$. Explain why this is a restriction.

Solution

The restriction for the denominator is $\theta \neq 2\pi n, n \in I$ because $cos\theta \neq 1$, and cos 2π is equal to 1. The ratio will be 1 for all multiples of 2π, which will not include $\frac{3\pi}{2}$.

This restriction is related to the numerator, since $tan\theta = \frac{sin\theta}{cos\theta}$. Since $cos\theta \neq 0,$ the restrictions are $\theta \neq \frac{\pi}{2} + \pi n, n \in I$. Adding π to $\frac{\pi}{2}$ results in the restriction of $\frac{3\pi}{2}$.

Use the following information to answer the next question.

Consider the following statements, within the domain $\{x|0 \leq \theta \leq 2\pi\}$, with respect to

$$\frac{sin\theta + 1}{cos^2\theta}$$

Statement 1	The first positive restriction is x ≠ $\frac{\pi}{2}$
Statement 2	The first positive restriction is x ≠ π
Statement 3	The first positive restriction is x ≠ $\frac{3\pi}{2}$
Statement 4	The first positive restriction is x ≠ 2π

5. The correct statement is

A) 1 B) 2 C) 3 D) 4

Solution

There is no concern for restrictions on the numerator since there is no fractional equivalent.

For the denominator, set $cos^2\theta = 0$ to determine the values of θ that are not allowed.

Take the square root of both sides.

$$cos\theta = 0$$

From the solution in the question above, we saw that the restrictions are

$\theta \neq \frac{\pi}{2} + \pi n, n \in I$

The first positive restriction is x $\neq \frac{\pi}{2}$.

The correct answer is A.

6. The restrictions, stated in degrees, for the trigonometric expression tan x + csc x are

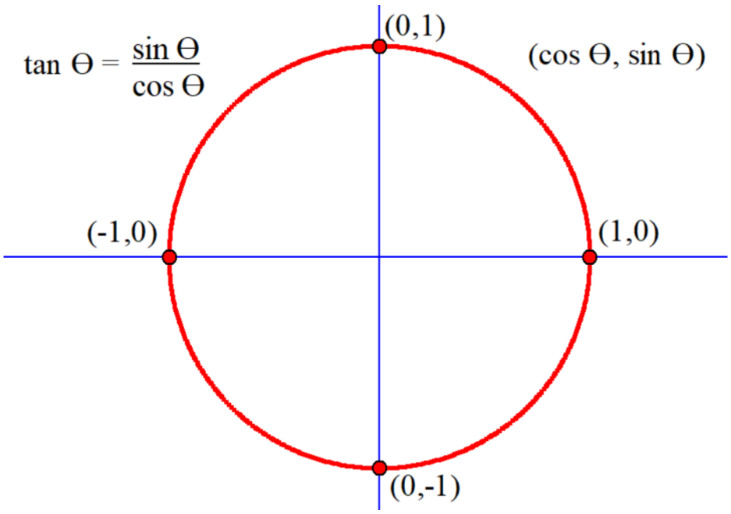
A) $x \neq 90^0 n, n \in I$
B) $x \neq 180^0 n, n \in I$
C) $x \neq 90^0 + 180^0 n, n \in I$
D) $x \neq 180^0 + 360^0 n, n \in I$

Solution

Although there are no distinctive visible denominators, the expression can be rewritten as $\frac{sinx}{cosx} + \frac{1}{sinx}$.

Therefore, neither cos x nor sin x can be equal to zero.

From the diagram below, notice all the points indicating a cos x ratio or a sin x ratio being equal to zero.



The correct answer is A.

7. The restrictions for $\frac{(cos\theta)(sin\theta)}{cos\theta+K}$ are $x \neq \pi + 2\pi n, n \in I$. The value of K is _1_.

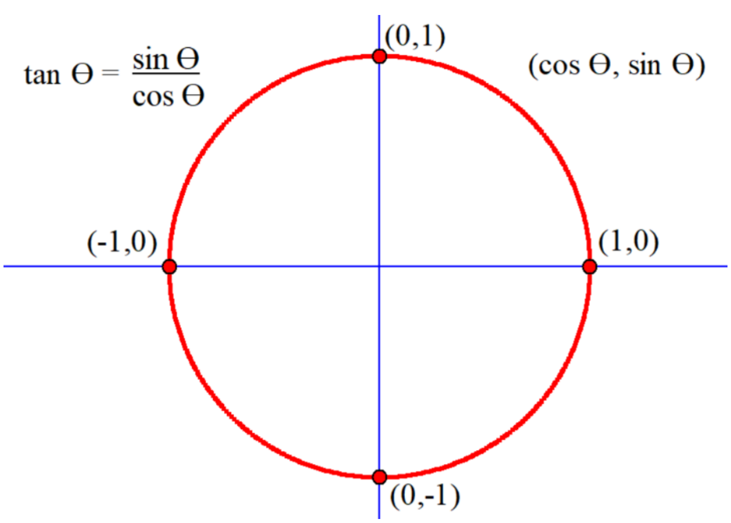
Solution

We do not have to be concerned about the numerators since there are no fractional equivalents.

Given $x \neq \pi + 2\pi n, n \in I,$ the first positive restriction is when $\theta = \pi$. From the diagram below, $cos\pi = -1$.

This means that (-1) + K ≠ 0.

Thus, K = 1.



The value of K is 1.

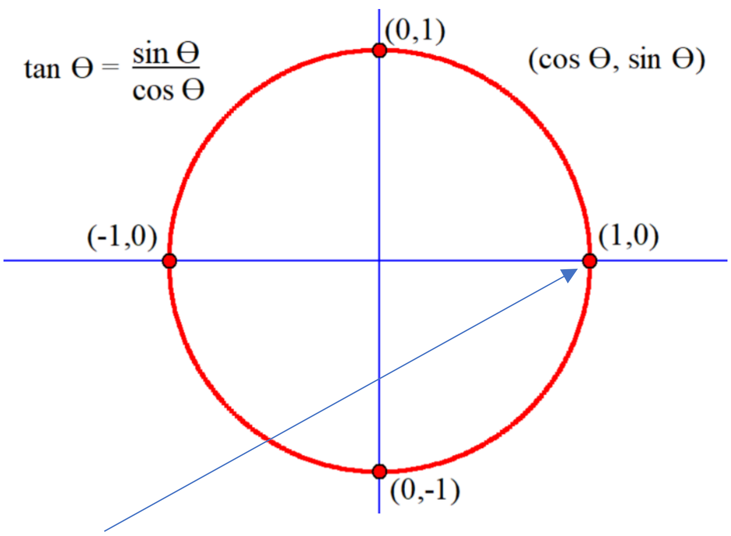
8. Determine the restrictions, in degrees, for the trigonometric identity $\frac{sec\theta+1}{sec\theta-1} + \frac{cos\theta+1}{cos\theta-1} = 0.$

Solution

The $sec\theta$ can be written as $\frac{1}{cos\theta}$. Since $cos\theta \neq 0$, the restrictions for this part are

$\theta \neq 90^0 + 180^0n$, n $\in I$.

The other area of concern is with the denominator, $cos\theta - 1$. We know that this expression cannot be equal to zero. The question is, what value of θ would make $cos\theta$ equal to 1?



Cos 360^0 = 1, and all multiples of 360^0 thereafter. The general restriction is written as $\theta \neq 360^0n$.

The final answer is $\theta \neq 90^0 + 180^0n$, and $\theta \neq 360^0n$, n $\in I$.