EXERCISE 8.2

Write 'True' or 'False' and justify your answer in each of the following:

1. tan 47°/cot 43 ° = 1

Solution:

True

Justification:

Since, tan (90° -θ) = cot θ

$$\frac{\tan 47^\circ}{\cot 43^\circ} = \frac{\tan(90^\circ - 43^\circ)}{\cot 43^\circ}$$

$$\frac{\tan 47^\circ}{\cot 43^\circ} = \frac{\cot 43^\circ}{\cot 43^\circ}$$

$$\frac{\tan 47^\circ}{\cot 43^\circ} = 1$$

2. The value of the expression ($\cos^2 23° – \sin^2 67°$) is positive.

Solution:

False

Justification:

Since, $(a^2-b^2) = (a+b)(a-b)$

$\cos^2 23° - \sin^2 67°$ =(cos 23°+sin 67°)(cos 23°-sin 67°)

= [cos 23°+sin(90°-23°)] [cos 23°-sin(90°-23°)]

= (cos 23°+cos 23°)(cos 23°-cos 23°) (∵sin(90°-θ) = cos θ)

= (cos 23°+cos 23°).0

= 0, which is neither positive nor negative

3. The value of the expression (sin 80° – cos 80°) is negative.

Solution:

False

Justification:

We know that,

sin θ increases when 0° ≤ θ ≤ 90°

cos θ decreases when 0° ≤ θ ≤ 90°

And (sin 80°-cos 80°) = (increasing value-decreasing value)

= a positive value.

Therefore, (sin 80°-cos 80°) > 0.

4. $\sqrt{(1– \cos^2\theta) \sec^2 \theta}$= tan θ

Solution:

True

Justification:

LHS: $\sqrt{((1 - \cos^2 \theta) \sec^2 \theta)}$

$= \sqrt{\sin^2 \theta \sec^2 \theta}$

$(\because \sin^2 \theta + \cos^2 \theta = 1 \Rightarrow \sin^2 \theta = 1 - \cos^2 \theta)$

$= \sqrt{\frac{\sin^2 \theta}{\cos^2 \theta}}$ (Since, $\sec^2 \theta = \frac{1}{\cos^2 \theta}$)

$= \frac{\sin \theta}{\cos \theta}$

$= \tan \theta$

= RHS

5. If cosA + cos²A = 1, then sin²A + sin⁴A = 1.

Solution:

True

Justification:

According to the question,

$\cos A + \cos^2 A = 1$

i.e., $\cos A = 1 - \cos^2 A$

Since,

$\sin^2 \theta + \cos^2 \theta = 1$

$\sin^2 \theta = 1 - \cos^2 \theta)$

We get,

$\cos A = \sin^2 A$ …(1)

Squaring L.H.S and R.H.S,

$\cos^2 A = \sin^4 A$ …(2)

To find $\sin^2 A + \sin^4 A = 1$

Adding equations (1) and (2),

We get

$\sin^2 A + \sin^4 A = \cos A + \cos^2 A$

Therefore, $\sin^2 A + \sin^4 A = 1$

6. $(\tan \theta + 2)(2 \tan \theta + 1) = 5 \tan \theta + \sec^2 \theta$.

Solution:

False

Justification:

L.H.S $= (\tan \theta + 2)(2 \tan \theta + 1)$

$= 2 \tan^2 \theta + \tan \theta + 4 \tan \theta + 2$

$= 2 \tan^2 \theta + 5 \tan \theta + 2$

Since, $\sec^2 \theta - \tan^2 \theta = 1$, we get, $\tan^2 \theta = \sec^2 \theta - 1$

$= 2(\sec^2 \theta - 1) + 5 \tan \theta + 2$

$= 2 \sec^2 \theta - 2 + 5 \tan \theta + 2$

$= 5 \tan \theta + 2 \sec^2 \theta \neq$ R.H.S

$\therefore$, L.H.S $\neq$ R.H.S