Simplify the following expressions:

1) $(1+\sin x)(\sec x - \tan x)$

2) $\dfrac{\sin a}{\cos a} + \dfrac{\cos a}{1+\sin a}$

3) $\cos^3 x + \sin^2 x \cos x$

4) $\dfrac{\cos\theta \sec\theta}{\cot\theta}$

5) $\dfrac{\sec^2\theta - 1}{\sec^2\theta}$

6) $\dfrac{\sin x}{\csc x} + \dfrac{\cos x}{\sec x}$

7) $\dfrac{1+\sin\alpha}{\cos\alpha} + \dfrac{\cos\alpha}{1+\sin\alpha}$

8) $\dfrac{2+\tan^2 a}{\sec^2 a} - 1$

9) $\dfrac{1+\cot A}{\csc A}$

Answers

1) $\cos x$ 4) $\tan\theta$ 7) $\dfrac{2}{\cos\alpha}$ OR $2\sec\alpha$

2) $\sec a$ 5) $\sin^2\theta$

3) $\cos x$ 6) 1 8) $\cos^2 a$

9) $\sin A + \cos A$

Prove the following identities:

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

2) $2\tan\alpha \sec\alpha = \dfrac{1}{1-\sin\alpha} - \dfrac{1}{1+\sin\alpha}$

3) $\dfrac{1}{1-\sin\theta} = \sec^2\theta + \tan\theta \sec\theta$

4) $\dfrac{1+\cos\theta}{\cos\theta} = \dfrac{\tan^2\theta}{\sec\theta - 1}$

5) $\sin a \cot a = \cos a$

6) $\dfrac{\tan x}{\sec x} = \sin x$

7) $\dfrac{\cos x}{\sec x} + \dfrac{\sin x}{\csc x} = 1$

8) $(\sin x + \cos x)^2 = 1 + 2\sin x \cos x$

9) $\dfrac{1-\sin x}{1+\sin x} = (\sec x - \tan x)^2$

10) $\sin\theta + \cos\theta \cot\theta = \csc\theta$