1. $\sec x(\sec x - \cos x) = \tan^2 x$

$\sec^2 x - \sec x \cos x$

$\sec^2 x - 1$

$\tan^2 x$

2. $\tan x(\cot x + \tan x) = \sec^2 x$

$\tan x \cot x + \tan^2 x$

$1 + \tan^2 x$

$\sec^2 x$

3. $\sin x(\csc x - \sin x) = \cos^2 x$

$\sin x \csc x - \sin^2 x$

$1 - \sin^2 x$

$\cos^2 x$

4. $\cos x(\sec x - \cos x) = \sin^2 x$

$\cos x \sec x - \cos^2 x$

$1 - \cos^2 x$

$\sin^2 x$

5. $\csc^2 x - \cos^2 x \csc^2 x = 1$

$\csc^2 x(1 - \cos^2 x)$

$\csc^2 x(\sin^2 x)$

1

6. $\cos^2 x + \tan^2 x \cos^2 x = 1$

$\cos^2 x(1 + \tan^2 x)$

$\cos^2 x(\sec^2 x)$

1

7. $(\sec x + 1)(\sec x - 1) = \tan^2 x$

$\sec^2 x + \cancel{\sec x - \sec x} - 1$

$\sec^2 x - 1$

$\tan^2 x$

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

$1 + \cancel{\sin x - \sin x} - \sin^2 x$

$1 - \sin^2 x$

$\cos^2 x$

9. $\sec^2 x + \tan^2 x \sec^2 x = \sec^4 x$

$\sec^2 x(1 + \tan^2 x)$

$\sec^2 x(\sec^2 x)$

$\sec^4 x$

10. $\cot^2 x \csc^2 x - \cot^2 x = \cot^4 x$

$\cot^2 x(\csc^2 x - 1)$

$\cot^2 x(\cot^2 x)$

$\cot^4 x$

11. $\cos^4 x - \sin^4 x = 1 - 2\sin^2 x$

$(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)$

$1(1 - \sin^2 x - \sin^2 x)$

$1 - 2\sin^2 x$

12. $\sec^4 x - \tan^4 x = 1 + 2\tan^2 x$

$(\sec^2 x + \tan^2 x)(\sec^2 x - \tan^2 x)$

$(1 + \tan^2 x + \tan^2 x)(1)$

$1 + 2\tan^2 x$

13. $\frac{1}{\sin x \cos x} - \frac{\cos x}{\sin x}\frac{\cos x}{\cos x} = \tan x$

$\frac{1}{\sin x \cos x} - \frac{\cos^2 x}{\sin x \cos x}$

$\frac{1 - \cos^2 x}{\sin x \cos x}$

$\frac{\sin^{\cancel{2}} x}{\sin \cancel{x} x \cos x}$

$\frac{\sin x}{\cos x}$

$\tan x$

14. $\frac{\sec x}{\sin x}\frac{\cos x}{\cos x} - \frac{\sin x}{\cos x}\frac{\sin x}{\sin x} = \cot x$

$\frac{1}{\sin x \cos x} - \frac{\sin^2 x}{\sin x \cos x}$

$\frac{1 - \sin^2 x}{\sin x \cos x}$

$\frac{\cos^2 x}{\sin x \cancel{\cos x}}$

$\frac{\cos x}{\sin x}$

$\cot x$

15. $\frac{\sin x}{\csc x} + \frac{\cos x}{\sec x} = 1$

$\sin x \cdot \frac{1}{\csc x} + \cos x \cdot \frac{1}{\sec x}$

$\sin x \cdot \sin x + \cos x \cdot \cos x$

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

1

16. $\frac{1}{\sec^2 x} + \frac{1}{\csc^2 x} = 1$

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

1

17. $\frac{1}{1 + \cos x} = \csc^2 x - \csc x \cot x$

$\frac{1 - \cos x}{1 - \cos x} \cdot \frac{1}{1 + \cos x}$ multiply by conjugate

$\frac{1 - \cos x}{1 - \cos^2 x}$

$\frac{1 - \cos x}{\sin^2 x}$

$\frac{1}{\sin^2 x} - \frac{\cos x}{\sin^2 x}$

$\csc^2 x - \frac{\cos x}{\sin x}\frac{1}{\sin x}$

$\csc^2 x - \cot x \csc x$

18. $\frac{1}{1 - \sin x} = \sec^2 x + \sec x \tan x$

$\frac{1 + \sin x}{1 + \sin x}\frac{1}{1 - \sin x}$

$\frac{1 + \sin x}{1 - \sin^2 x}$

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

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

$\sec^2 x + \frac{\sin x}{\cos x}\frac{1}{\cos x}$

$\sec^2 x + \tan x \sec x$

19. $\frac{\cos x}{\sec x - 1} - \frac{\cos x}{\tan^2 x} = \cot^2 x$

$\frac{\cos x}{\sec x - 1} - \frac{\cos x}{\sec^2 x - 1}$

$\frac{\sec x + 1}{\sec x + 1}\frac{\cos x}{\sec x - 1} - \frac{\cos x}{(\sec x + 1)(\sec x - 1)}$

$\frac{\sec x \cos x + \cancel{\cos x} - \cancel{\cos x}}{\sec^2 x - 1}$

$\frac{1}{\tan^2 x}$

$\cot^2 x$

20. $\frac{\sin x}{1-\cos x}\frac{1+\cos}{1+\cos} + \frac{1-\cos x}{\sin x}\frac{\sin x}{\sin x} = 2\csc x$

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

$\frac{\sin x + \cancel{\cos x \sin x} + \sin x - \cancel{\sin x \cos x}}{\sin^2 x}$

$\frac{2\sin x}{\sin^2 x}$

$\frac{2}{\sin x}$

$2\csc x$

OR

$\frac{\sin x}{1-\cos x}\frac{\sin x}{\sin x} + \frac{1-\cos x}{\sin x}\frac{1-\cos}{1-\cos}$

$\frac{\sin^2 x}{\sin x(1-\cos x)} + \frac{1-2\cos x+\cos^2 x}{\sin x(1-\cos x)}$

$\frac{\sin^2 x+\cos^2 x+1-2\cos x}{\sin x(1-\cos x)}$

$\frac{1+1-2\cos x}{\sin x(1-\cos x)}$

$\frac{2-2\cos x}{\sin x(1-\cos x)}$

$\frac{2\cancel{(1-\cos x)}}{\sin x\cancel{(1-\cos x)}}$

$\frac{2}{\sin x}$

$2\csc x$

21. $\frac{\sec x}{\sec x - \tan x}\frac{\sec x+\tan x}{\sec x+\tan x} = \sec^2 x + \sec x\tan x$

$\frac{\sec^2 x + \sec x\tan x}{\sec^2 x - \tan^2 x}$

$\frac{\sec^2 x + \sec x\tan x}{1}$

22. $\frac{1+\sin x}{1-\sin x}\frac{1+\sin x}{1+\sin x} = 2\sec^2 x + 2\sec x\tan x - 1$

$\frac{1+2\sin x+\sin^2 x}{1-\sin^2 x}$

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

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

$\sec^2 x + 2\frac{\sin x}{\cos x}\cdot\frac{1}{\cos x} + \tan^2 x$

$\sec^2 x + 2\tan x\sec x + \sec^2 x - 1$

$2\sec^2 x + 2\tan x\sec x - 1$

23. $\sin^3\cos^2 x = \sin^3 x - \sin^5 x$

$\sin^3 x(1-\sin^2 x)$

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

24. $\sin^3 x\cos^2 x = \cos^2 x\sin x - \cos^4 x\sin x$

$\cos^2 x\sin x(1-\cos^2 x)$

$\cos^2 x\sin x(\sin^2 x)$

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

25. $\sec^2 x + \csc^2 x = \sec^2 x\csc^2 x$

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

$\frac{\sin^2 x}{\sin^2 x\cos^2 x} + \frac{\cos^2 x}{\sin^2 x\cos^2 x}$

$\frac{\sin^2 x+\cos^2 x}{\sin^2 x\cos^2 x}$

$\frac{1}{\sin^2 x\cos^2 x}$

$\sec^2 x\csc^2 x$

26. $\sec x + \tan x = \frac{1}{\sec x - \tan x}\frac{\sec+\tan}{\sec+\tan}$

$\frac{\sec x+\tan x}{\sec^2 x - \tan^2 x}$

$\frac{\sec x+\tan x}{1}$

27. $\frac{1-3\cos x-4\cos^2 x}{\sin^2 x} = \frac{1-4\cos x}{1-\cos x}$

$\frac{(1-4\cos x)(1+\cos x)}{1-\cos^2 x}$

$\frac{(1-4\cos x)\cancel{(1+\cos x)}}{\cancel{(1+\cos x)}(1-\cos x)}$

$\frac{1-4\cos x}{1-\cos x}$

28. $\frac{\sec^2 x - 6\tan x + 7}{\sec^2 x - 5}$

$\frac{1+\tan^2 x - 6\tan x + 7}{1+\tan^2 x - 5}$

$\frac{\tan^2 x - 6\tan x + 8}{\tan^2 x - 4}$

$\frac{(\tan x - 4)\cancel{(\tan x - 2)}}{(\tan x + 2)\cancel{(\tan x - 2)}}$

$\frac{\tan x - 4}{\tan x + 2}$