Simplify the following trig expressions completely:

1. \( \frac{\tan^2 t + 1}{1 + \cot^2 t} \)

2. \( \frac{1}{\sec t - \tan t} - \frac{1}{\sec t + \tan t} \)

3. \( \sec t \tan t \cos t \)

4. \( \sin^2 t \cot t \csc t \)

5. \( \frac{1 - \cos^2 t}{\sin^2 t} \)

6. \( \frac{\tan^2 t}{1 - \sec^2 t} \)

7. \( \tan^2 t(\csc^2 t - 1) \)

8. \( \frac{1 - \cos^2 t}{1 + \cos t} \)

9. \( \frac{\cos^2 t}{1 - \cos^2 t} \)

10. \( \frac{\sec^2 t - 1}{\tan t} \)

11. \( \frac{\tan t + 1}{\sec t} \)

12. \( \frac{1 + \cot t}{\csc t} \)

13. \( \frac{\cos^2 t - 1}{\sin^2 t - 1} \)

14. \( \cos t \csc t(\sec^2 t - 1) \)

15. \( \frac{\sec t \tan t}{\tan^2 t + 1} \)

16. \( \frac{\sin^2 t \cot^2 t}{1 - \sin^2 t} \)

17. \( \frac{\cos^2 t - 1}{\cos^2 t \tan^2 t} \)

18. \( \cos t(\sec t - \cos t) \)

19. \( \cot t(\tan t + \cot t) \)

20. \( \frac{\tan t + \cot t}{\cot t} \)

21. \( \frac{\tan t}{\tan t + \cot t} \)

22. \( \sec t \cot t - \cot t \cos t \)

23. \( \sin t \tan t - \csc t \tan t \)

24. \( \frac{\cot^2 t \cos^2 t}{\cot^2 t - \cos^2 t} \)

25. \( \frac{\sin^2 t - \tan^2 t}{\tan^2 t \sin^2 t} \)

26. \( \frac{(\sin t + \tan t)^2 + \cos^2 t - \sec^2 t}{\tan t} \)

27. \( \frac{2 \sin t \cos t + (\sin t - \cos t)^2}{\sec t} \)

28. \( \frac{\sin t (1 + \sin t)}{1 - \cos^2 t} - 1 \)
29. \( \frac{1 - \tan^2 t}{1 + \tan^2 t} + 1 \)

30. \( \frac{\tan t - \tan t \sin^2 t}{2 \sin t \cos t} \)

31. \( \frac{\sec t - \cos t}{3 \tan t \sin t} \)

32. \( \frac{\sin^3 t + \cos^3 t}{1 - \sin t \cos t} \)

33. \( \frac{\cos^3 t + \sin^3 t}{(\cos t + \sin t)^2} \)

ANSWERS

1. \( \tan^2 t \)

2. \( 2 \tan t \)

3. \( \tan t \)

4. \( \cos t \)

5. \( 1 \)

6. \( -1 \)

7. \( 1 \)

8. \( 1 - \cos t \)

9. \( \cot^2 t \)

10. \( \tan t \)

11. \( \sin t + \cos t \)

12. \( \sin t + \cos t \)

13. \( \tan^2 t \)

14. \( \tan t \)

15. \( \sin t \)

16. \( 1 \)

17. \( -1 \)

18. \( \sin^2 t \)

19. \( \csc^2 t \)

20. \( \sec^2 t \)

21. \( \sin^2 t \)

22. \( \sin t \)

23. \( -\cos t \)

24. \( 1 \)

25. \( -1 \)

26. \( 2 \sin t \)

27. \( \cos t \)

28. \( \csc t \)

29. \( 2\cos^2 t \)

30. \( \frac{1}{2} \)

31. \( \frac{1}{3} \)

32. \( \sin t + \cos t \)

33. \( \frac{1 - \cos t \sin t}{\cos t + \sin t} \)

34. \( \tan^2 t \)

35. \( \sin t \)

36. \( 2 \sec t \)

37. \( 2 \csc t \)