1. Write as a single fraction, and simplify as much as possible: \( \frac{1}{x+3} - \frac{1}{x-7} \)

2. Let \( y(x) = \tan (x^5 + 3 \ln(x)) \). Find \( y'(x) \).

3. Write as a single fraction, and simplify as much as possible: \( \frac{2}{q+1} - \frac{1}{q+4} \)

4. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{2x^2 + y}{2x^2 + 3y} \)

5. Find \( \frac{d}{dx} \left( \int_{\sqrt{x}}^{x} \cos(2t^2) \, dt \right) \).

6. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{2e^x + 5}{2e^x + 10} \)

7. Find \( \int \frac{x}{\sqrt{x^2 + 1}} \, dx \).

8. Let \( g(x) = 3 - x^2 \). Evaluate the expression \( g(-x) - g(x) \), and simplify it as much as possible.

9. Let \( f(x) = 7 - x \). Evaluate the expression \( f(3) - f(2 - x) \), and simplify it as much as possible.

10. Find all real numbers \( t \) such that \( |t - 7| < 4 \).

11. Find \( \int \sin(7 - 3\theta) \, d\theta \).

12. Find all real numbers \( z \) such that \( 12 - z^2 > 7 \).

13. Find all real numbers \( b \) such that \((-7, -b)\) is in the second quadrant (and not on any of the coordinate axes).
14. Find \( \frac{d}{dx} \left( \int_1^x \ln(1 + t^6) \, dt \right) \).

15. Determine whether the improper integral \( \int_1^\infty \frac{8}{1 + x^4} \, dx \) converges. Show your work (below or on the back side); it must be correct to get credit for this problem. (No partial credit!) You need not actually evaluate the integral.

16. Simplify completely (for \( x \neq 0 \)): \( \left( \frac{2\sqrt{3}}{3x^{-1}} \right)^2 \)

17. Find all real numbers \( x \) such that \( |x + 9| \leq 5 \).

18. Let \( g(t) = (2t^4 - \arctan(t))^7 \). Find \( g'(t) \).

19. Find all real numbers \( y \) such that \( |9 + y| < 5 \).

20. Write as a single fraction, and simplify as much as possible: \( \frac{3}{y - 1} - \frac{1}{y - 2} \)

21. Find all real numbers \( z \) such that \( z^2 - 12 \leq 4 \).

22. Let \( h(y) = \sec(y^3 - 13 \arcsin(y)) \). Find \( h'(y) \).

23. Determine whether the improper integral \( \int_2^\infty \frac{6}{3 + 2x^3} \, dx \) converges. Show your work (below or on the back side); it must be correct to get credit for this problem. (No partial credit!) You need not actually evaluate the integral.

24. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{2y^2 + 2x}{2y^2 + 6x} \)

25. Find all real numbers \( x \) such that \( |10 - x| < 2 \).

26. Find all real numbers \( x \) such that \( |10 + x| \leq 2 \).

27. Let \( f(t) = 10|\ln(t)|^6 - 22e^t \). Find \( f'(t) \).

28. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{3\cos(5x)}{3\cos(5x) - 6} \)

29. Let \( y(x) = (10x^7 - \tan(x))^3 \). Find \( y'(x) \).
30. Find \( \int t \cos(7 - t^2) \, dt \).

31. Find \( \frac{d}{dx} \left( \int_{-1}^{x} \sqrt{7 + \arctan(z)} \, dz \right) \).

32. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{2w^2 - 2}{2w^2 - 6} \)

33. Find all real numbers \( x \) such that \( x^2 + 3 \leq 17 \).

34. Let \( g(x) = 3 - x^2 \). Evaluate the expression \( g(1 - x) - g(x) \), and simplify it as much as possible.

35. Which of the following four expressions can represent a strictly positive number for some real value of \( x \)? List all possibilities: \(-x\), \(-x^2\), \(-|x|\), \( |−x| \).

36. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{\sin(7x) + 7}{\sin(7x) - 7} \)

37. Find \( \frac{d}{dx} \left( \int_{7}^{x} e^{17 + t^5} \, dt \right) \).

38. Let \( f(y) = 2\cos^{13}(y) + 35 \ln(y) \). Find \( f'(y) \).

39. Find all real numbers \( y \) such that \( 3 + y^2 \leq 17 \).

40. Write as a single fraction, and simplify as much as possible: \( \frac{2}{c + 6} - \frac{1}{c + 2} \)

41. Find all real numbers \( x \) such that \( |−x| = −x \).

42. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \( \frac{x e^x + x^2}{2x e^x + x^2} \)

43. Determine whether the improper integral \( \int_{1}^{\infty} \frac{1}{5 \sqrt{x} - 1} \, dx \) converges. Show your work (below or on the back side); it must be correct to get credit for this problem. (No partial credit!) You need not actually evaluate the integral.

44. Write as a single fraction, and simplify as much as possible: \( \frac{3}{w + 1} - \frac{1}{w - 5} \)
45. Simplify completely (for $x \neq 0$): \[
\frac{\frac{4}{2^{x^2}}}{\frac{1}{2^x}}
\]

46. Let $f(x) = \tan(4x^6 + 2x^4 + 37)$. Find $f'(x)$.

47. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: \[
\frac{4e^x}{4e^x + 6}
\]

48. Find $\int (2 - w)^{16} dw$.

49. Write as a single fraction, and simplify as much as possible: \[
\frac{6}{c - 4} - \frac{1}{c - 2}
\]

50. Determine whether the improper integral \[
\int_0^3 \frac{e^{-x}}{\sqrt{x}} \, dx
\] converges. Show your work (below or on the back side); it must be correct to get credit for this problem. (No partial credit!) You need not actually evaluate the integral.

51. Simplify completely (for $y > 0$): \[
\frac{\frac{2}{\sqrt{y}}}{\frac{y^{1/2}}{2}}
\]

52. Determine whether the improper integral \[
\int_{11}^{\infty} \frac{5}{1 + 2x + x^r} \, dx
\] converges. Show your work (below or on the back side); it must be correct to get credit for this problem. (No partial credit!) You need not actually evaluate the integral.