Justify your conclusions and provide completely simplified, exact answers.

NO CALCULATORS ALLOWED.

For 1–8, find the first derivative formula for each function. In each case take the derivative with respect to the independent variable as implied by the expression on the right side of the equal sign. For full-credit, use the appropriate name for each derivative, simplify your results completely, leaving no negative or rational exponents, and do not use the product or quotient rules in situations where the constant-multiple rule or the power rule is applicable.

1. \( f(x) = \frac{1}{x} + \frac{1}{\sqrt{x}} \)
2. \( f(x) = \frac{12}{x} - \frac{4}{x^3} + \frac{3}{x^4} \)

3. \( T = \cot(\theta) \)
4. \( f(x) = \frac{x}{x^3 + 7} \)  

(Use the Quotient Rule)
5. \( g(x) = \csc^2(x) \)
6. \[ y = \frac{2x + 1}{x^2 - 1} \] 

(Use the Quotient Rule)
7. \( f(t) = 3e^t - 3te^t \)
8. \( f(x) = \frac{\cos(x)}{\sqrt{x}} \) (Use the Quotient Rule)