Honors PreCalculus

\[
\left( \frac{f(x)}{g(x)} \right)' = \frac{g(x) \cdot f'(x) - f(x) \cdot g'(x)}{(g(x))^2}
\]

Use the quotient rule to find the derivative of each function.

1. \( f(x) = \frac{x}{1-x} \)
2. \( f(x) = \frac{x^2 + 2}{x - 2} \)
3. \( f(x) = \frac{1-x^2}{2-x} \)
4. \( f(x) = \frac{\sqrt{1+x}}{2x} \)
5. \( f(x) = \frac{\sqrt{9-x^2}}{2x} \)
6. \( f(x) = \frac{x^2 - x + 1}{x^2 + 1} \)

Find the equation of the tangent line to the graph of the function at the indicated point.

7. \( f(x) = (x^2 - 9)(\sqrt{x+2}) \) at \( x = -1 \)
8. \( f(x) = \frac{x+1}{2x-3} \) at \( x = 2 \)

9. The temperature \( T \) of a person during an illness is given by \( T(t) = \frac{2t}{t^2 + 1} + 98.6 \), where \( T \) is the temperature, in degrees Fahrenheit, at time \( t \), in hours.
   
   (a) Find the rate of change of the temperature with respect to time.
   
   (b) Find the temperature at \( t = 1 \).
   
   (c) Find the rate of change of the temperature at \( t = 1 \).