Evaluate the limit

1. \( \lim_{{x \to 2}} \frac{x^2 + 5}{2x - 7} \)

2. \( \lim_{{x \to 0}} \left( \frac{\tan(-5x)}{x} + 1 \right) \)

Calculate \( y' \)

3. \( y = \cos(3x - 5x^{-1}) \)

4. \( y = \left( x^3 - 4 \sin x \right) \left( \frac{1}{x - 2} \right) \)

5. Find the equation of the line tangent to \( f(x) = 3x^4 - 5 \) at \( x = 1 \).
6. (15 points) Use the definition \[ f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h} \] to evaluate the derivative of \( f(x) = 7x^2 - 5 \).

7. (5 points each part) The graph of \( g(x) \) is shown at right.
   a) \( \lim_{x \to 3} g(x) = _________ \)
   b) \( \lim_{x \to 3^-} g(x) = _________ \)
   c) \( g(3) = ___________ \)
   d) list the x values between 0.5 and 4.5 at which \( g \) is NOT continuous

8. (6 points each part) Give answers as decimals with 5 digits and include units.
   The position of a particle as a function of time is \( f(t) = \frac{t + 2}{t + 1} \) cm (with \( t \) given in seconds).
   a) What is the average velocity of the particle from \( t = 1 \) s to \( t = 2 \) s?
   b) What is the instantaneous velocity of the particle at \( t = 2 \) s?
   c) After a very long time (\( t > 1 \) year), what is the position of the particle?

9. (5 points each part) Let \( f \) and \( g \) be functions such that \( f(5) = 3, f'(5) = 13, f'(1) = -2, g(5) = 2, g'(5) = 1, g'(3) = -7 \).
   a) \((f + g)'(5) = _________ \)
   b) \( \left( \frac{f}{g} \right)'(5) = _________ \)
   c) \((g \circ f)'(5) = _________ \)