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Name:

1. State the precise definition of the derivative and then use it to compute the derivative of $\frac{1}{x - 2}$. 
2. Given that \( \lim_{x \to a} f(x) = 4 \), \( \lim_{x \to a} g(x) = 12 \) and \( \lim_{x \to a} h(x) = -3 \), compute the following limits showing all your work or explain why they do not exist.

(a) \( \lim_{x \to a} \frac{g(x) - h(x)}{f(x)} \)

(b) \( \lim_{x \to a} \sqrt{4 - f(x)} \)

(c) \( \lim_{x \to a} \frac{\sqrt{g(x) + h(x)}}{f(x)} \)
3. Define what it means for a function to be continuous.

4. Determine the value of $c$ which makes the function $f(x) = \begin{cases} 2x + c & : \text{if } x \leq 3 \\ x^2 & : \text{if } x > 3 \end{cases}$ continuous.
5. (a) Does the function $f(x) = x^2$ have an inverse? Why or why not?

(b) Find the inverse of the function $f(x) = \frac{x+2}{3x-2}$. 
6.  (a) State the Intermediate Value Theorem.

(b) Prove that the equation $x^7 + x + 3 = 5$ has a solution.
7. Compute \( \lim_{x \to \infty} \frac{2x^2 - 1}{4x^3 - 5x - 1} \).