1. Use the graph of a function \( g \) shown below to answer the following questions:

![Graph of function g](image)

(a) Find \( \lim_{x \to -2} g(x) \)

(b) Find \( \lim_{x \to -1^+} g(x) \)

(c) Where does \( g \) fail to be continuous?

(d) Where does \( g \) fail to be differentiable?

2. The following graph shows two continuous functions, \( f \) and \( g \), both with domains \((-\infty, \infty)\), where \( f \) is the linear function with the dashed plot. Use the graphs to compute

\[
\lim_{x \to \infty} (g(f(x))
\]
3. Use algebra and the limit laws to evaluate the following limits.

(10) (a) \( \lim_{x \to 3} (x^2 - 4x + 2) \)

(10) (b) \( \lim_{x \to 1} \frac{x^2 + 3x - 4}{x^2 - 1} \)

(10) (c) \( \lim_{x \to -\infty} \frac{\sqrt{x^2 + x - 1}}{x + 2} \)

(10) (d) \( \lim_{x \to 0^-} \frac{|x^2 - 1|}{x^2 - 1} \)
(10) 4. Use either the “$h \to 0$” or the “$x \to a$” definition of the derivative to find $f'(-2)$ if $f(x) = x^2 + 2x - 1$

(10) 5. Give an $\varepsilon-\delta$ proof to show

$$\lim_{x \to 2} (-3x + 5) = -1$$
(10) 6. Let \( f \) be a function whose values are always in the interval \([0, 1]\). Prove the equation \( f(x) - x = 0 \) has a solution in the interval \([0, 1]\).

(10) 7. Find an inverse for the function

\[
f(x) = \frac{2 - x}{3 + 2x}
\]