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

![Graph of $g(x)$]

(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

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

(a) \( \lim_{x \to -1} x^2 - 6x + 5\sqrt{3 - x} \)

(b) \( \lim_{x \to -\infty} \frac{2x + 5}{\sqrt{4x^2 - 8x + 3}} \)

(c) \( \lim_{x \to 8} \frac{\sqrt{x + 1} - 3}{x - 3} \)

(d) If \( \lim_{x \to 2} f(x) = 5 \) and \( \lim_{x \to 2} g(x) = -1 \), find \( \lim_{x \to 2} f(x)g(x) \)
4. Use either the “$h \to 0$” or the “$x \to a$” definition of the derivative to find $f'(4)$ if $f(x) = x^3 - 2x - 1$

5. Give an $\epsilon-\delta$ proof to show

$$\lim_{x \to -1} (2x + 5) = 3$$
(10) 6. Use the intermediate value theorem to prove that the equation $\cos(x) - x = 0$ has a solution in the interval $[0, 1]$

(10) 7. Find an inverse for the function

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