1. How close to \(-2\) do we need to take \(x\) so that \(3x - 5\) is within 0.01 of \(-11\)?

2. How close to 3 do we need to take \(x\) so that \(\frac{1}{3x}\) is within 0.1 of \(\frac{1}{9}\)?

3. How close to \(-1\) do we need to take \(x\) so that \(\frac{3}{(x + 1)^8} > 50,000\)?
4. Using the precise definition of the limit, prove \( \lim_{x \to 5} (4x - 1) = 19 \).

5. Given that \( 2x - 3 \leq f(x) \leq x^2 - 3 \) for all \( x \), determine \( \lim_{x \to 2} f(x) \), if it can be determined.

   Support your work by citing the appropriate theorem.
6. Find the following limits, if it exists. If the limit does not exist, support your answer by finding left and right handed limits. You must show ALL work. Calculator answers only will not receive credit.

a.) \[ \lim_{x \to -4} \frac{x^2 - 16}{x^2 + 6x + 8} \]

b.) \[ \lim_{x \to 1} f(x) \text{ where } f(x) = \begin{cases} x^2 + 1 & \text{if } x > 1 \\ 8x - 1 & \text{if } x \leq 1 \end{cases} \]

c.) \[ \lim_{x \to 0} \frac{\sqrt{2-x} - \sqrt{2}}{x} \]
d.) \[ \lim_{x \to 2} \frac{x - 2}{|3x - 6|} \]

7. For each of the following functions, determine where the function is discontinuous, if any. If the function is discontinuous, indicate which condition is not met.

a.) \[ f(x) = \frac{3x + 1}{\sqrt{x - 3}} \]

b.) \[ f(x) = \begin{cases} x^2 + 1 & \text{if } x > 1 \\ 2x & \text{if } x < 1 \\ x - 1 & \text{if } x = 1 \end{cases} \]
8. Find the value of \( c \) that makes the following function continuous for all real \( x \):
\[
f(x) = \begin{cases} 
  x^2 + c & \text{if } x < -1 \\
  cx + 4 & \text{if } x \geq -1 
\end{cases}
\]

9. Use the Intermediate Value Theorem to find an interval that contains a root to the equation \( x^5 - 2x^4 - x - 3 \). A Graphical proof will not receive credit.