1. (40 points) Consider the function

\[ f(x) = \frac{1}{(2 + x)^2}. \]

By using the definition of the derivative, find \( f'(2) \). You are not allowed to use the differentiation rules.

2. (15 points) Is the following statement true or false?

\[ \lim_{x \to -\infty} \ln \left( \frac{-1}{x} \right) = -\infty \]

True

False

SEE OTHER SIDE FOR MORE PROBLEMS.
3. (25 points) Find

\[ \lim_{{x \to \infty}} \frac{{4x^2 + 7x - 8x^3 + 19}}{{3x^2 + 6x + 5}}. \]

4. (20 points) Suppose \( f(x) \) has the following graph.

Which of the following is true about the derivative function \( f'(x) \)?

(A) \( f'(-2) > 0. \)

(B) \( f'(-1) < 0. \)

(C) \( f'(3) < 0. \)

(D) \( f'(5) = 0. \)