1. Let \( f(x) = 2x^3 - 3x^2 - 12x + 3 \)

(a) What are the critical values for \( f \)?

(b) What are the absolute maximum and minimum values of \( f \) on the interval \([-2, 1]\)?

2. If \( f'(x) < 4 \) on the interval \([1, 3]\) and \( f(1) = -2 \), show that \( f(3) < 6 \)
3. Let $f(x) = \frac{x^2}{x^2 - 1}$

(a) Find and simplify $f'(x)$.

(b) On what intervals is the graph of $f$ increasing?

(c) On what intervals is the graph of $f$ decreasing?

(d) What are the local extrema of $f$?
Question 5 continued: \( f(x) = \frac{x^2}{x^2 - 1} \)

(5) (e) Find and simplify \( f''(x) \)

(5) (f) On what intervals is the graph of \( f \) concave up?

(5) (g) On what intervals is the graph of \( f \) concave down?

(4) (h) What are the inflection points of \( f \)
Question ?? continued \( f(x) = \frac{x^2}{x^2 - 1} \)

(5) (i) Sketch the graph of \( f \).
(12) 4. Evaluate the following limits

\[ \lim_{{x \to 0}} \frac{e^{3x} - 1}{x} \]

(10) 5. Find the points on the ellipse \(4x^2 + y^2 = 4\) that are farthest away from the point \((1, 0)\)