

Math 1A: Discussion 9/26/2018 Problems

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Question 1: Limits at Infinity

Compute the following limits at infinity.

$$\lim_{x \rightarrow \infty} \frac{\sqrt{4x^2 + 1}}{x + 3}$$

$$\lim_{x \rightarrow -\infty} [2 \ln(x + 1) - \ln(x^2)]$$

$$\lim_{x \rightarrow \infty} \left[3 \cos(x) - \frac{2}{\sqrt{x}} \right]$$

Question 2: Derivatives and Tangent Lines

Consider the function $f(x) = \frac{1}{x^2}$.

- What is the derivative of this function?
- What is the equation of the tangent line to this function at the point $(1/2, 4)$?

Question 3: Derivatives and Graphs

Consider the function $g(x) = x^3 - x$.

- Factor this polynomial. What are its zeros?
- Sketch the graph of the function g .
- Without calculating the actual derivative of this function, sketch a graph of the function g' .
- Calculate the derivative using the definition of the derivative. Does this match your graph from the previous part?