

1. Evaluate the following limit:

$$\lim_{x \rightarrow 0^+} x^2 \ln x$$

2. Let

$$f(x) = \frac{1}{x^2 - 9}$$

- (a) What is the domain of f ?
- (b) Find any vertical and horizontal asymptotes.
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3. (Derivatives) Continuing with the same f .

- (a) Where is f increasing? Decreasing? Find all critical numbers and local maxima and minima.
- (b) Where is f concave up? concave down? Find all inflection points. You may use that

$$f''(x) = \frac{6(x^2 + 3)}{(x^2 - 9)^3}$$