

L'Hopital's Rule and Asymptotes

1. Find

$$\lim_{x \rightarrow 1} \frac{x^{100} - 1}{x^{50} - 1}$$

using L'Hopital's rule.

2. Find

$$\lim_{x \rightarrow \infty} \frac{\ln(\ln x)}{x}$$

using L'Hopital's rule.

3. Determine if $y = \frac{(\ln x)^2}{x}$ has horizontal asymptotes.

4. Find the vertical asymptotes of $y = \frac{6}{x-5}$, and sketch these asymptotes.