

## L'HOPITAL'S RULE (4.7)

NAME \_\_\_\_\_

In each problem determine if L'Hopital's Rule applies. If so, use the rule to find the limit. If not, find the limit numerically. Express your final answers in exact form.

1. 
$$\lim_{x \rightarrow \pi} \frac{\sin(3x)}{x - \pi}$$

2. 
$$\lim_{t \rightarrow 0} \frac{e^{2t} - 1}{e^t}$$

3. 
$$\lim_{\theta \rightarrow 0} \frac{\arctan \theta}{2\theta}$$

4. 
$$\lim_{x \rightarrow \infty} \frac{e^{-x}}{1 + \ln x}$$

5. 
$$\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x}$$

6. 
$$\lim_{u \rightarrow \infty} \frac{\sqrt{u^2 + 1}}{u}$$

7. 
$$\lim_{y \rightarrow 0} \frac{2^y}{y^2}$$

8. 
$$\lim_{x \rightarrow 1^+} \left( \frac{1}{\ln(1+x)} - \frac{1}{x} \right)$$

9. 
$$\lim_{\theta \rightarrow \infty} \theta \sin\left(\frac{1}{\theta}\right)$$

$$10. \lim_{z \rightarrow 0^+} \cos\left(\frac{1}{z}\right)$$

$$11. \lim_{t \rightarrow \infty} \cos^2\left(\frac{1}{t}\right)$$

$$12. \lim_{x \rightarrow 0} \frac{x^2 + 3x}{\sinh x}$$

$$13. \lim_{y \rightarrow 0} \frac{y}{\sqrt[3]{\sin y}}$$

$$14. \lim_{x \rightarrow 0^+} \frac{\cot x}{\ln x}$$

$$15. \lim_{x \rightarrow \infty} \frac{x + \sin(2x)}{x}$$