

Find the following limits. Show all work and use L'Hopital's Rule whenever possible. Express your answer in exact form. For example, if the value of the limit is π do not write 3.14.

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

2. $\lim_{\theta \rightarrow \pi^+} \frac{1}{\sin(\theta - \pi)}$

3. $\lim_{x \rightarrow \pi^+} \frac{2x - 2\pi}{\sin(x - \pi)}$

4. $\lim_{z \rightarrow \pi^+} \sin\left(\frac{1}{z - \pi}\right)$

5. $\lim_{\alpha \rightarrow 0} \alpha \cdot \cot(2\alpha)$

6. $\lim_{y \rightarrow \infty} y \cdot \ln\left(\frac{y+1}{y-1}\right)$

7. $\lim_{x \rightarrow 0^-} x^3 \cdot e^{1/x}$

8. $\lim_{t \rightarrow \infty} \left(1 + \frac{3}{t}\right)^t$

9. $\lim_{w \rightarrow \infty} (\ln w - \sqrt{w})$

10. $\lim_{t \rightarrow \infty} \frac{\sin\left(\frac{1}{t}\right)}{\ln t}$

12. $\lim_{v \rightarrow \infty} \frac{v^2}{e^{-v}}$

13. $\lim_{x \rightarrow 0^+} \frac{x^2 \cdot \sin\left(\frac{1}{x}\right)}{\sin x}$

14. $\lim_{u \rightarrow 0^+} (2^u - 1)\sqrt{u}$

15. $\lim_{x \rightarrow \infty} (\ln|2x - 4| - \ln|x + 3|)$