

Limits using L'Hopital's Rule

$$1. \lim_{x \rightarrow -1} \frac{x^4 + x^3 + 2x + 2}{x + 1}$$

$$2. \lim_{x \rightarrow 0} \frac{e^x - 1}{x^2 + 3x}$$

$$3. \lim_{x \rightarrow 0} \frac{3 \sin 4x}{5x}$$

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

$$5. \lim_{x \rightarrow 2\pi} \frac{x \sin x + x^2 - 4\pi^2}{x - 2\pi}$$

$$6. \lim_{x \rightarrow \infty} x \cdot e^{1/x}$$

$$7. \lim_{x \rightarrow 0} \frac{\sin x - x}{7x^3}$$

$$8. \lim_{x \rightarrow 0} \frac{e^x - x - 1}{5x^2}$$

$$9. \lim_{x \rightarrow 0} \frac{\sin^2 3x}{x^2}$$

$$10. \lim_{x \rightarrow \infty} \frac{e^{3x}}{e^{3x} + 5}$$

$$11. \lim_{x \rightarrow \infty} \frac{\ln(3x + 5)}{\ln(7x + 3)}$$

$$12. \lim_{x \rightarrow 0} x \csc x$$

$$13. \lim_{x \rightarrow 0} \csc 6x \cdot \sin 7x$$

$$14. \lim_{x \rightarrow 0} \frac{e^x - \sin x - 1}{x^4 + 8x^3 + 12x^2}$$

$$15. \lim_{x \rightarrow \pi} \frac{\cos x + 1}{(x - \pi)^2}$$

$$16. \lim_{x \rightarrow \infty} \frac{4x^3 - 2x^2 + 3x - 2}{5x^3 - 7x^2 - x + 9}$$

$$17. \lim_{x \rightarrow \infty} \frac{e^x}{x^3}$$

$$18. \lim_{x \rightarrow 0} \frac{1 - \cos x}{3x^3}$$

$$19. \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$$

$$20. \lim_{x \rightarrow 0^+} (\sin x)^{\sin x}$$

$$21. \lim_{x \rightarrow 0} \left(\frac{1}{x^2}\right)^x$$

$$22. \lim_{x \rightarrow \infty} (1 + x)^{\frac{1}{x}}$$

$$23. \lim_{x \rightarrow 0^+} (1 + x)^{\frac{1}{x}}$$

$$24. \lim_{x \rightarrow \frac{\pi}{2}} (\cos x)^{\cos x}$$

Answers

1. 1
2. $1/3$
3. $12/5$
4. $1/e$
5. 6π
6. 1
7. $-1/42$
8. $1/10$
9. 9
10. 1
11. Skip!!
12. 1
13. $7/6$
14. $1/24$
15. $1/2$
16. $4/5$
17. ∞
18. Dne!!
19. e
20. 1
21. 1
22. 1
23. e
24. 1