

# Practice Problems | Limits and Continuity

## Limits involving real numbers

1.  $\lim_{x \rightarrow -2} (3x^2 - 2x + 1)$

9.  $\lim_{x \rightarrow 0} \frac{1}{x}$

2.  $\lim_{x \rightarrow -1} \left( \frac{x^2 - 4}{x - 2} \right)$

10.  $\lim_{x \rightarrow 0} \left( \frac{\sqrt{x+9} - 3}{x} \right)$

3.  $\lim_{x \rightarrow 2} \left( \frac{x^2 - 4}{x - 2} \right)$

11.  $\lim_{x \rightarrow 2} \sqrt{1 - x^2}$

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

12.  $\lim_{x \rightarrow 0} \frac{3}{x^4}$

5.  $\lim_{x \rightarrow 0} \frac{3 - 3\cos x}{x}$

13.  $\lim_{x \rightarrow 3} \frac{2x^2 - 18}{x - 3}$

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

14.  $\lim_{x \rightarrow 0} \frac{1}{|x|}$

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

15.  $\lim_{x \rightarrow 3} \frac{1}{(x-3)^2}$

8.  $\lim_{x \rightarrow 3} \frac{x+2}{x-3}$

16.  $\lim_{x \rightarrow 0} \frac{(\sin x)^2}{3x^2}$

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### Limits Involving Infinity

$$17. \lim_{x \rightarrow \infty} \frac{\sqrt{4x^2+1}}{x}$$

$$25. \lim_{x \rightarrow -\infty} \frac{4x^3}{x^2+1}$$

$$18. \lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2+1}}{x}$$

$$26. \lim_{x \rightarrow \infty} \frac{\sqrt{2x-1}}{4x+3}$$

$$19. \lim_{x \rightarrow \infty} \frac{2x^2}{\sqrt{x^2+1}}$$

$$27. \lim_{x \rightarrow \infty} \frac{1}{x^2}$$

$$20. \lim_{x \rightarrow -\infty} \frac{2x^2}{\sqrt{x^2+1}}$$

$$28. \lim_{x \rightarrow \infty} \frac{5x^2}{2x^3-9x}$$

$$21. \lim_{x \rightarrow \infty} \frac{\sqrt{6x^2+1}}{4x^2+9}$$

$$29. \lim_{x \rightarrow \infty} \frac{\sqrt{3-2x+x^2}}{\sqrt{9x^2+4x}}$$

$$22. \lim_{x \rightarrow \infty} e^{-x}$$

$$30. \lim_{x \rightarrow \infty} \frac{x^2+2}{\sqrt{3x^2+1}}$$

$$23. \lim_{x \rightarrow -\infty} e^{-x}$$

$$31. \lim_{x \rightarrow \infty} \frac{3x}{x+1}$$

$$24. \lim_{x \rightarrow -\infty} (2x^3 + \sin x)$$

$$32. \lim_{x \rightarrow -\infty} \frac{1}{x+2}$$

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### Answer Key:

1. 17
2. 1
3. 4
4. 1
5. 0
6. 4
7.  $1/3$
8. Does not exist
9.  $\infty$ ; Does not exist
10.  $1/6$
11. Does not exist
12.  $\infty$ ; Does not exist
13. 12
14.  $\infty$ ; Does not exist
15.  $\infty$ ; Does not exist
16.  $1/3$
17. 2
18. -2
19.  $\infty$ ; Does not exist
20.  $\infty$ ; Does not exist
21. 0
22. 0
23.  $\infty$
24.  $-\infty$ ; Does not exist
25.  $-\infty$ ; Does not exist
26. 0
27. 0
28. 0
29.  $1/3$
30.  $\infty$ ; Does not exist
31. 3
32. 0