

1. $\lim_{x \rightarrow 3} (2x^3 - 5x + 4)$

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

3. $\lim_{y \rightarrow -3} \frac{y^2 + 5y + 6}{y + 3}$

4. $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$

5. $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

6. $\lim_{\theta \rightarrow \infty} \frac{\sin \theta}{\theta}$

7. $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$

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

9. $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 4}$

10. $\lim_{x \rightarrow 0} \frac{\tan(3x)}{x}$

$$11. \lim_{x \rightarrow \infty} \frac{6x^4 - 2}{3 - 4x^4}$$

$$12. \lim_{x \rightarrow 0} \frac{\sin^2 x}{x^2}$$

$$13. \lim_{x \rightarrow \infty} \frac{\sqrt{4x^2 - 5}}{x^2 + 3}$$

$$14. \lim_{x \rightarrow \infty} \frac{\sqrt{16x^6 - 9}}{x + 3}$$

$$15. \lim_{x \rightarrow -1^+} \frac{4x + 4}{|x + 1|}$$

$$16. \lim_{x \rightarrow \infty} \frac{9}{x^2 + 1}$$

17. If possible find:

$$\lim_{x \rightarrow -1} f(x), f(x) = \begin{cases} x, & x < -1 \\ -x^2 + 2x, & x \geq -1 \end{cases}$$

18. Find the value of a such that $f(x)$ is continuous at $x = 4$.

$$f(x) = \begin{cases} x^2 - 5, & x < 4 \\ 5ax, & x \geq 4 \end{cases}$$

19. Give an example of the following types of discontinuity:

- a. Point
- b. Jump
- c. Infinite
- d. Oscillating

20. Find $\lim_{x \rightarrow 5} f(x)$

x	$f(x)$
4.9	5.45
4.99	5.495
4.999	5.4995
5	3
5.001	5.5005
5.01	5.505
5.1	5.55

21. See question below:

Suppose $g(x) \leq f(x) \leq h(x)$ for all values of x . If $g(x) = -x^2 - 1$ and $h(x) = \cos(3x)$, find $\lim_{x \rightarrow 0} f(x)$.

a) $\lim_{x \rightarrow 0} f(x) = 1$

b) $\lim_{x \rightarrow 0} f(x)$ cannot be determined.

c) $\lim_{x \rightarrow 0} f(x) = -1$

d) $\lim_{x \rightarrow 0} f(x) = 0$

22. Make a piecewise function where $f(a)$ does not exist but its limit does.

23. $f(x) = (x - 2)^{\frac{2}{3}}$. At $x = 2$:

a. Does the limit exist?

b. Is $f(x)$ continuous?

c. Is $f(x)$ differentiable?

24. $\lim_{x \rightarrow 0} \frac{1 - \cos(3x)}{x^2}$

25. True or False:

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

and for every constant a ,

$$\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x}\right)^x = e^a$$

26. Find $\lim_{x \rightarrow \infty} \left(1 + \frac{3}{x}\right)^x$