



MATHS

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LIMITS

Question Bank

1. Consider the function $f(x) = x^2 + x$. Find the $\lim_{x \rightarrow 1} f(x)$

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2. Evaluate

$$\lim_{x \rightarrow c} f(x)$$

where

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x^1 + a_0$$



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3. Find the following limits :

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



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4. Find the following limits :

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



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5. Find the following limits :

$$\lim_{x \rightarrow 4} \{(x - 1)(x - 2)(x - 3)\}$$



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6. Find the limits :

$$\lim_{x \rightarrow 1} \left\{ \frac{x - 1}{x^2 + 1} \right\}$$



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7. Find the limits :

$$\lim_{x \rightarrow 1} \left\{ \frac{x^2 + x + 1}{x^3 + 1} \right\}$$



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8. Find the limits :

$$\lim_{x \rightarrow 3} \left\{ \frac{x^2 - 3x + 9}{x^2 - 9} \right\}$$



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9. Find the limits :

$$\lim_{x \rightarrow 2} \left\{ \frac{x - 2}{x^2 + 4} \right\}$$



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10. Find the limits :

$$\lim_{x \rightarrow 0} \left\{ \frac{\sqrt{x-1} - \sqrt{1-x}}{x} \right\}$$



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11. Find the following limits :

$$\lim_{x \rightarrow 5} \left\{ \frac{x^9 - 5^9}{x - 5} \right\}$$



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12. Find the following limits :

$$\lim_{x \rightarrow 1} \left\{ \frac{x^{\frac{1}{5}} - 1}{x^{\frac{1}{100}} - 1} \right\}$$

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13. Find the following limits :

$$\lim_{x \rightarrow 3} \left\{ \frac{x^7 - 3}{x^8 - 3} \right\}$$

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14. Find the following limits :

$$\lim_{x \rightarrow 0} \left\{ \frac{\sqrt{1+x} - 1}{x} \right\}$$

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15. Find the following limits :

$$\lim_{x \rightarrow 0} \left\{ \frac{(x+1)^5 - 1}{x} \right\}$$

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16. Find the value of $\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{x}$

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17. Find $\lim_{x \rightarrow 1} f(x)$ where $f(x) = \begin{cases} \frac{x^2-1}{x-1} & x \neq 1 \\ 1 & x = 1 \end{cases}$

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18. $\lim_{x \rightarrow 2} \frac{\sqrt{3-x} - 1}{2-x}$

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19. $\lim_{x \rightarrow 3} \frac{\sqrt{12 - x} - x}{\sqrt{6 + x} - 3}$

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

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21. The value of $\lim_{x \rightarrow 0} \frac{1 - \cos x}{2x^2}$ is

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22. Evaluate: $(\lim)_{x \rightarrow \frac{\pi}{2}} \frac{1 + \cos 2x}{(\pi - 2x)^2}$

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23. Proved that $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$

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24. Find $\lim_{x \rightarrow \pi} \frac{\sin(x - \pi)}{(\pi(\pi - x))}$

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25. Find $\lim_{x \rightarrow 0} f(x)$ where $f(x) = \begin{cases} 2x + 3 & x \leq 0 \\ 3(x + 1) & x > 0 \end{cases}$

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26. Evaluate $\lim_{x \rightarrow 0} f(x)$, where

$$f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

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27. Suppose $f(x) = \begin{cases} a + bx & x < 1 \\ 4 & x = 1 \\ b - ax & x > 1 \end{cases}$ and if $\lim_{x \rightarrow 1} f(x) = f(1)$,

what are the values of a and b ?

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28. If the function $f(x)$ satisfies $(\lim)_{x \rightarrow 1} \frac{f(x) - 2}{x^2 - 1} = \pi$,

evaluate $(\lim)_{x \rightarrow 1} f(x)$



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29. Evaluate the following limits :

$$\lim_{x \rightarrow 1} \{2(x + 3) + 7\}$$



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30. Evaluate the following limits :

$$\lim_{x \rightarrow 1} (3x + 1)(x + 1)$$



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31. Evaluate the following limits :

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



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32. Evaluate the following limits :

$$\lim_{x \rightarrow 0} \frac{px + q}{ax + b}$$

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33.
$$\lim_{x \rightarrow -2} \frac{\frac{1}{x} + \frac{1}{2}}{x + 2}$$

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34. Evaluate the following limits:

$$\lim_{x \rightarrow -2} \left(\frac{x^2 - 25}{x - 5} \right)$$

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35. Evaluate the following limits :

$$\lim_{x \rightarrow \frac{1}{3}} \frac{9x^2 - 1}{3x - 1}$$



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36. Evaluate the following limits :

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



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37. Evaluate the following limits :

$$\lim_{x \rightarrow 1} \left[\frac{1}{x - 1} - \frac{2}{x^2 - 1} \right]$$



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38. Evaluate the following limits :

$$\lim_{x \rightarrow 2} \frac{\sqrt{3x - 2} - x}{2 - \sqrt{6 - x}}$$



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39. Evaluate the following limits :

$$\lim_{x \rightarrow 0} \frac{x}{5 - |x|}$$



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40. Evaluate the following limits :

$$\lim_{x \rightarrow -2} \frac{x^{11} - 1}{x^7 - 1}$$



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$$41. \left(\lim \right)_{x \rightarrow 0} \frac{\cos x}{\pi - x}$$

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$$42. \left(\lim \right)_{x \rightarrow 0} \frac{\cos 2x - 1}{\cos x - 1}$$

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$$43. \lim_{x \rightarrow 0} \frac{\sin ax + bx}{ax + \sin bx}$$

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$$44. \lim_{x \rightarrow 0} (\cos ecx - \cot x)$$

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45. Evaluate the following limits :

$$\lim_{x \rightarrow 1} \frac{x^{\frac{1}{20}} - 1}{x^{\frac{1}{40}} - 1}$$

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46. $\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}, a, b \neq 0$

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47. Show that $\lim_{x \rightarrow 5} \frac{|x - 5|}{x - 5}$ does not exist.

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48. Find the value of 'a' such that $\lim_{x \rightarrow 2} f(x)$ exists, where

$$f(x) = \begin{cases} ax + 5 & x < 2 \\ x - 1 & x \geq 2 \end{cases}$$

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49. If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \leq x \leq 1 \\ nx^3 + m, & x > 1 \end{cases}$. For what integers m and

n does $\lim_{x \rightarrow 0} f(x)$ and $\lim_{x \rightarrow 1} f(x)$ exist?

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