



MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

LIMITS & CONTINUITY

Spq

1. Show that $\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{x} = 3$



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



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3. Compute $\lim_{x \rightarrow \infty} \frac{x^2 + 5x + 2}{2x^2 - 5x + 1}$



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4. Compute $\lim_{x \rightarrow \infty} (\sqrt{x+1} - \sqrt{x})$



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5. Evaluate $\lim_{x \rightarrow 1} \frac{\sin(x - 1)}{x^2 - 1}$



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6. Evaluate $\lim_{x \rightarrow \infty} \frac{x^2 - \sin x}{x^2 - 2}$



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Vsaq 1 D Star Q

1. $\lim_{x \rightarrow 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$



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

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3. Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 6x^2 + 9x}{x^2 - 9}$

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4. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 - 8x + 15}{x^2 - 9}$

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



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6. Evaluate $\lim_{x \rightarrow 2} \frac{2x^2 - 7x - 4}{(2x - 1)(\sqrt{x} - 2)}$



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7. Evaluate $\lim_{x \rightarrow 0} \frac{(1 + x)^{3/2} - 1}{x}$



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8. Evaluate $\lim_{x \rightarrow 0} \frac{\sqrt[3]{1+x} - \sqrt[3]{1-x}}{x}$



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9. Evaluate $\lim_{x \rightarrow 0} \frac{(1+x)^{1/8}(1-x)^{1/8}}{x}$



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10. Evaluate $\lim_{x \rightarrow 0} \frac{e^{7x} - 1}{x}$



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11. Find $\lim_{x \rightarrow 0} \frac{e^{3+x} - e^3}{x}$

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12. Evaluate $\lim_{x \rightarrow 0} \frac{e^x + e^3}{x}$

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13. Evaluate $\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{x}$

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14. Evaluate $\lim_{x \rightarrow 0} \frac{e^x - \sin x - 1}{x}$



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15. Find $\lim_{x \rightarrow 0} \frac{a^x - 1}{b^x - 1}$



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16. Evaluate $\lim_{x \rightarrow 1} \frac{\log_e x}{x - 1}$



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17. Evaluate $\lim_{x \rightarrow 0} \frac{\log(1 + 5x)}{x}$

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

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19. Evaluate $\lim_{x \rightarrow 0} \frac{e^x - 1}{\sqrt{1+x} - 1}$

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20. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 + 3x + 2}{x^2 - 6x + 9}$



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



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22. Evaluate $\lim_{x \rightarrow \infty} \frac{11x^3 - 3x + 4}{13x^3 - 5x^2 - 7}$



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23. Evaluate $\lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x)$

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24. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$

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25. Compute $\lim_{x \rightarrow 0} \left(\frac{\sin ax}{\sin bx} \right) b \neq 0, a \neq b$

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26. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos 2mx}{\sin^2 nx}$



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27. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos mx}{1 - \cos nx}$



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28. Evaluate $\lim_{x \rightarrow \pi/2} \frac{\cos x}{\left(x - \frac{\pi}{2}\right)}$



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29. Evaluate $\lim_{x \rightarrow a} \frac{\tan(x - a)}{x^2 - a^2}$



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30. Evaluate $\lim_{x \rightarrow 0} \frac{x(e^x - 1)}{1 - \cos x}$



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31. Find $\lim_{x \rightarrow \infty} \frac{8|x| + 3x}{3|x| - 2x}$



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32. Show that $\lim_{x \rightarrow 2^-} \frac{|x - 2|}{x - 2} = -1$

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33. Show that $\text{Lt}_{x \rightarrow 0^+} \left(\frac{2|x|}{x} + x + 1 \right) = 3$

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34. Evaluate $\text{Lt}_{x \rightarrow 2} \left\{ \frac{1}{x - 2} - \frac{4}{x^2 - 4} \right\}$

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35. Find $\lim_{x \rightarrow -\infty} \frac{5x^3 + 4}{\sqrt{2x^9 + 1}}$



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36. Find $\lim_{x \rightarrow a} \left[\frac{\sin(x - a)\tan^2(x - a)}{(x^2 - a^2)^2} \right]$



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Saq

1. Evaluate $\lim_{x \rightarrow 0} \frac{\cos ax - \cos bx}{x^2}$



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2. Find $\lim_{x \rightarrow 0} \frac{\sin(a + bx) - \sin(a - bx)}{x}$



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3. Find $\lim_{x \rightarrow a} \left(\frac{x \sin a - a \sin x}{x - a} \right)$



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Problems On Continuity

1. Show that

$$f(x) = \begin{cases} \frac{\cos ax - \cos bx}{x^2} & \text{if } x \neq 0 \\ \frac{1}{2}(b^2 - a^2) & \text{if } x = 0 \end{cases} \text{ is continuous at } 0$$



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2. Is f defined by

$$f(x) = \begin{cases} \frac{\sin 2x}{x} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases} \text{ continuous?}$$



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3. If f is given by $f(x) = \begin{cases} k^2x - k & \text{if } x \geq 1 \\ 2 & \text{if } x < 1 \end{cases}$ is a

continuous function on \mathbb{R} , then find k .



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4. Is f given by

$$f(x) = \begin{cases} \frac{x^2 - 9}{x^2 - 2x - 3} & \text{if } 0 < x < 5 \text{ and } x \neq 3 \\ 1.5 & \text{if } x = 3 \end{cases},$$

continuous at the points 3.



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5. Check the continuity of the following function at 2

$$f(x) = \begin{cases} \frac{1}{2}(x^2 - 4) & \text{if } 0 < x < 2 \\ 0 & \text{if } x = 2 \\ 2 - 8x^{-3} & \text{if } x > 2 \end{cases}$$



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6. Is the function f , defined by

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases} \text{ continuous on } \mathbb{R} ?$$



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7. Show that $f(x) = \sin x$ is continuous on \mathbb{R} .



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8. Find the real constants a , b , so that the function

$$f \text{ given by } f(x) = \begin{cases} \sin x & \text{if } x \leq 0 \\ x^2 + a & \text{if } 0 < x < 1 \\ bx + 3 & \text{if } 1 \leq x \leq 3 \\ -3 & \text{if } x > 3 \end{cases} \text{ is}$$

continuous on \mathbb{R} .

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9. If f is a function defined by

$$f(x) = \begin{cases} \frac{x-1}{\sqrt{x}-1} & \text{if } x > 1 \\ 5 - 3x & \text{if } -2 < x \leq 1 \\ \frac{6}{1-10} & \text{if } x < -2 \end{cases} \text{ then discuss}$$

the continuity of f .



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Vsaq Saq 2 D Hard Q 3 D Misq

1. Show that f , given by $f(x) = \frac{x - |x|}{x}$ ($x \neq 0$) is continuous on $\mathbb{R} - \{0\}$



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2. Find whether the limit of $f(x)$ exists or not at $x = 3$

$$\text{, where } f(x) = \begin{cases} x + 2 & \text{if } -1 < x \leq 3 \\ x^2 & \text{if } 3 < x < 5 \end{cases}$$



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3. If $f(x) = \frac{|x|}{x}$ then show that $\lim_{x \rightarrow 0} f(x)$ does not exist .



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4. Evaluate $\lim_{x \rightarrow 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$



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5. Evaluate $\lim_{x \rightarrow 0} \frac{2 + \cos^2 x}{x + 2007}$



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