MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

CONTINUITY

Solved Examples And Exercises

1. Discuss the continuity of the function $f(x)=\begin{cases}2x-1 & \text{if } x<2 \\ \frac{3x}{2} & \text{if } x\geq 2\end{cases}$

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2. If $f(x)=\dfrac{2x+3\sin x}{3x+2\sin x}, x\neq 0$ is continuous at $x=0$, then find $f(0)$.

A. 0

B. 1

C. 2

D. 3

Answer: B

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3. For what value of k is the function $f(x) = \begin{cases} \dfrac{x^2 - 1}{x - 1}k, \end{cases}$

$, x \neq 1, x = 1 \text{continuous at} x = 1?$

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4. Find the values of a and b so that the function f given by

$$f(x) = \begin{cases} ax + 1 & \text{if} \quad x \leq 3 \\ ax + 3 & \text{if} \quad x > 3 \end{cases}.$$

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5. Let $f(x)=\dfrac{\log\left(1+\frac{x}{a}\right)-\log\left(1-\frac{x}{b}\right)}{x}, \quad x\neq 0$. Find the value of f at $x=0$ so that f becomes continuous at $x=0$.

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6. If $f(x)=\begin{cases}\frac{\cos^2 x-\sin^2 x-1}{\sqrt{x^2+1}-1} & \text{if} \quad x\neq 0\\ k & \text{if} \quad x=0\end{cases}$,is continuous at $x=0$ then find `k'.

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7. Extend the definition of the following by continuity $f(x)=\dfrac{1-\cos 7(x-\pi)}{5(x-\pi)^2}$ at the point $x=\pi$

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8. Find the value of a for which the function f defined by

$f(x) = \begin{cases} a\frac{\sin \pi}{2}(x+1), x \leq 0\frac{\tan x - \sin x}{x^3}, x > 0 \end{cases}$ is continous at x=0

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9. Show that $f(x) = \begin{cases} 1+x^2 & \text{if } 0 \leq x \leq 1 \\ 2-x & \text{if } x > 1 \end{cases}$ is discontinuous at $x = 1$

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10. $\begin{cases} \frac{x^2}{2} & \text{if } 0 \leq x \leq 1 \\ 2x^2 - 3x + \frac{3}{2} & \text{if } l < x \leq 2 \end{cases}$ at $x = 1$

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11. Examine the continuity of the function $f(x) =$

$\begin{cases} 3x - 2 & x \leq 0 \\ x + 1 & x > 0 \end{cases}$

a t $x = 0$

Also sketch the graph of this function.

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12. Discuss the continuity of the function

$f(x) = \{(x, x > 0)(1, x = 0)(- x, x < 0)$ at the point $x = 0$

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13. Discuss the continuity of the function $f(x) = \left\{\frac{x}{|x|}, x \neq 0, x = 0\right.$

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14. If $f(x) = \dfrac{\tan\left(\frac{\pi}{4} - x\right)}{\cot 2x}$ for $x \neq \dfrac{\pi}{4}$, find the value which can be assigned to $f(x)$ at $x = \dfrac{\pi}{4}$ so that the function $f(x)$ becomes continuous every where in $\left[0, \dfrac{\pi}{2}\right]$.

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15. Show that $f(x) = \begin{cases} 1 + x^2 & \text{if } 0 \leq x \leq 1 \\ 2 - x & \text{if } x > 1 \end{cases}$ is discontinuous at $x = 1$

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16. Show that $f(x) = \left\{ \frac{x - |x|}{2}, \right.$ w h e n$x \neq 0$ and 2 w h e n$x = 0$ is discontinuous at$x = 0$.

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17. Find the relationship between a and b so that the function $'f'$ defined by $f(x) = \{ax + 1, \quad \text{if} \quad x \leq 3b \quad x + 3, \quad \text{if} \quad x < 3$ is continuous at $x = 3$.

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18. If $f(x) = \begin{cases} \frac{\sin 3x}{x}, when x \neq 0 \\ 1, when x = 0 \end{cases}$. Find whether $f(x)$ is continuous at $x = 0$

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19. Prove that the function $f(x) = \begin{cases} \frac{\sin x}{x}, x < 0, \\ x + 1, x \geq 0 \end{cases}$ is everywhere continuous.

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20. Let $f(x) = \begin{cases} \frac{1 - \cos x}{x^2}, & when\ x \neq 0 \\ 1, & when\ x = 0 \end{cases}$. Show that $f(x)$ is discontinuous at $x = 0$.

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21. If $f(x) = \begin{cases} e^{\frac{1}{x}}, & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$ Find whether f is continuous at $x = 0$.

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22. Test the continuity of the following function at the origin; $f(x) = \begin{cases} \frac{x}{|x|}, x \neq 0 \text{ and } 1, x = 0 \end{cases}$

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23. The function $f(x) = \left\{\left(\frac{x^2}{a}, \quad \text{if} \quad 0 \leq x < 1\right), \left(a, \quad \text{if} \quad 1 \leq x < \sqrt{2}\right), \left(\frac{2b^2 - 4b}{x^2}, \quad \text{if}\right.\right.$ sqrt(2) le xlt 00):}$iscont \in uouson$[0,oo]dot $F \in dthemostsuitab \leq valuesof$a and bdot`

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24. A function $f(x)$ is defined as $f(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3}; \quad \text{if} \quad x \neq 3 \text{ and } 5 \quad \text{if} \quad x = 3 \end{cases}$ Show that $f(x)$ is continuous at $x = 3$.

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25. If $f(x) = f(x) = \begin{cases} \dfrac{\sin(a+1)x + \sin x}{x^x c}, x < 0 \dfrac{\sqrt{x+bx^2}-\sqrt{x}}{bx\sqrt{x}}, x \geq 0, \end{cases}$ is continuous at $x = 0, then$ $(a) a = -\dfrac{3}{2}, b = 0, c = \dfrac{1}{2}$ (b) $a = -\dfrac{3}{2}, b = 1, c = -\dfrac{1}{2}$ $a = -\dfrac{3}{2}, b \in R - [0], c = \dfrac{1}{2}$ (d) none of these

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26. If $f(x) \begin{cases} \dfrac{1-\sin^2 x}{3\cos^2 x}, x < \dfrac{\pi}{2} \text{ and } a, x = \dfrac{\pi}{2} \text{ and } \dfrac{b(1-\sin x)}{(\pi - 2x)^2}, x > \dfrac{\pi}{2} \end{cases}$ then $f(x)$ is continuous at $x = \dfrac{\pi}{2},$ if (a)$a = \dfrac{1}{3}, b = 2$ (b) $a = \dfrac{1}{3}, = \dfrac{8}{3}$ (c)$a = \dfrac{2}{3}, b = \dfrac{8}{3}$ (d) none of these

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27. The value of $f(0)$, so that the function $f(x)=\dfrac{\sqrt{a^2-ax+x^2}-\sqrt{a^2+ax+x^2}}{\sqrt{a+x}-\sqrt{a-x}}$ becomes continuous for all x, given by (a) $a^{\frac{3}{2}}$ (b) $a^{\frac{1}{2}}$ (c) $-a^{\frac{1}{2}}$ (d) $-a^{\frac{3}{2}}$

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28. The points of discontinuity of the function `f(x)={1/5\ (2x^2+3)\ ,\ \ xlt=1

6-5x ,\ \ 1

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29. The function $f(x)=\tan x$ is discontinuous on the set $(a)\{n\pi; n\in Z\}$ (b) $\{2n\pi n\in Z\}$ $\left\{(2n+1)\dfrac{\pi}{2}: n\in Z\right\}$ (d) $\left\{\dfrac{n\pi}{2}: n\in Z\right\}$

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30. The function $f(x) = \tan x$ is discontinuous on the set

$(a)\{n\pi; n \in Z\}$ (b) $\{2n\pi n \in Z\}$ $\left\{(2n+1)\frac{\pi}{2} : n \in Z\right\}$ (c) $\left\{\frac{n\pi}{2} : n \in Z\right\}$ is continuous and $f'(1^-) = (\log)_{10} e$ d. $f(x)$ is continuous and $f'(1^-) = -(\log)_{10} e$

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31. If the function $f(x) = \left\{(\cos x)^{\frac{1}{x}}, x \neq 0k, x = 0\right.$ is continuous at $x = 0$, then the value of k is $(a)0$ (b) 1 (c) -1 (d) e

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32. If $f(x) = (x+1)^{\cot x}$ be continuous at $x = 0$, the $f(0)$ is equal to (a) 0 (b) $\frac{1}{e}$ (c) e (d) none of these

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33. If $f(x)=\{mx+1, x\leq\frac{\pi}{2}\sin x+n, x>\frac{\pi}{2}$ is continuous at $x=\frac{\pi}{2}$, then

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34. If $f(x)=\{mx+1, x\leq\frac{\pi}{2}\sin x+n, x>\frac{\pi}{2}$ is continuous at $x=\frac{\pi}{2}$, then (A) m=1,n=0 (B)$m=\frac{n\pi}{2}+1$ (C) $n=\frac{m\pi}{2}$ (D)$m=n=\frac{\pi}{2}$

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35. If $f(x)=\left\{\frac{1-\cos 10x}{x^2a}, x<0\frac{\sqrt{x}}{\sqrt{625+\sqrt{x}}-25}, x>0, x=0\right.$ then the value of a so that $f(x)$ may be continuous at $x=0, is$ 25 (b) -1 (c) 1 (d) indeterminate

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36. If $f(x) = \begin{cases} \frac{\sin(\cos x) - \cos x}{(\pi - 2x)^2}, x \neq \frac{\pi}{2}; k, x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, then k is equal to

(a)0 (b) $\frac{1}{2}$ (c) 1 (d) -1

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37. Discuss the continuity of the function $f(x)$ given by $f(x) = \{2x - 1, \quad \text{if} \quad x < 0 \text{ and } 2x + 1, \quad \text{if} \quad x \geq 0$

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38. The value of a for which the function $f(x) = f(x) = \begin{cases} \frac{(4^x - 1)\hat{3}}{\sin(xa)\log\{(1 + x^2 3)\}}, x \neq 012(\log 4)^3, x = 0 \end{cases}$ may be continuous at $x = 0$ is 1 (b) 2 (c) 3 (d) none of these

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39. If $f(x)=\begin{cases} ax^2+b & 0\leq x<1 \\ 4 & x=1 \\ x+3 & 1<x\geq 2 \end{cases}$ then the value of(a, b) for which $f(x)$ cannot be continuous at $x=1$, is (a)$(2, 2)$ (b) $(3, 1)$(c)$(4, 0)$ (d) $(5, 2)$

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40. If $f(x)=\begin{cases} \frac{2^{x+2}-16}{4^x-16}\end{cases}$, if $x\neq 2$, k if $x=2$ is continuous at $x=2$, find k

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41. Let $f(x)=\begin{cases} \frac{1-\cos 4x}{x^2 a,}, & \text{if} \quad x<0 \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4}, & \text{if} \quad x>0, & \text{if} \quad x=0\end{cases}$

Determine the value of a so that $f(x)$ is continuous at $x=0$.

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42. if the function $f(x)$ defined by f(x)=$\frac{\log(1+ax)-\log(1-bx)}{x}$, if $x \neq 0$ and k if x=0 is continuous at x=0 , find k.

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43. If $f(x) = \{mx+1, x \leq \frac{\pi}{2}, \sin x + n, x > \frac{\pi}{2}$ is continuous at $x = \frac{\pi}{2}$, then

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44. Find the value of the constant k so that the function given below is continuous at $x = 0$.

$$f(x) = \left\{\frac{1-\cos kx}{x \sin x}, \quad x \neq 0 \quad \text{and} \quad \frac{1}{2} \quad when \;\; x = 0\right.$$

A. 1 or -1

B. -1

C. $\frac{1}{2}$ or $-\frac{1}{2}$

D. `1/2

Answer: A

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45. Discuss the continuity of the $f(x)$ at the indicated point: $f(x) = |x| + |x - 1|$ at $x = 0,\ 1$.

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46. if the function $f(x)$ defined by f(x)=$\frac{\log(1+ax) - \log(1-bx)}{x}$, if $x \neq 0$ and k if x=0 is continuous at x=0 , find k.

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47. If $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \frac{\pi}{4}$. Find the value of $f\left(\frac{\pi}{4}\right)$ so that $f(x)$ becomes continuous at $x = \frac{\pi}{4}$.

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48. Determine $f(0)$ so that the function $f(x)$ defined by $f(x) = \frac{(4^x - 1)^3}{\frac{\sin x}{4}\log\left(1 + \frac{x^2}{3}\right)}$ becomes continuous at $x = 0$

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49. The function $f(x) = \{x^2 aa$,if1lt=x

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50. If $f(x) = \begin{cases} \frac{x-4}{|x-4|a+b, \quad \text{if} \quad x=4} + a, \quad \text{if} \quad x < 4\frac{x-4}{|x-4|} + b, \quad \text{if} \quad x > \end{cases}$

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51. Prove that the function $f(x) = \begin{cases} \frac{x}{|x| + 2x^2}, x \neq 0 \text{ and } k, x = 0 \end{cases}$ remains discontinuous at $x = 0$, regardless the choice of k

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52. Show that $f(x) = \begin{cases} \frac{\sin 3x}{\tan 2x \frac{3}{2}, \quad \text{if} \quad x = 0}, \quad \text{if} \quad x < 0 \frac{\log(1 + 3x)}{e^{2x} - 1}, \quad \text{if} \quad x > 0 iscont \end{cases}$

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53. Find all point of discontinuity of the function $f(t) = \frac{1}{t^2 + t - 2}$, where $t = \frac{1}{x - 1}$

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54. Given the function $f(x) = \frac{1}{x + 2}$. Find the points of discontinuity of the function $f(f(x))$

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55. If $f(x)=|x-a|\phi(x),$ where $\phi(x)$ is continuous function, then (a) $f'(a^+)=\phi(a)$ (b) $f'(a^-)=-\phi(a)$ (c) $f'(a^+)=f'(a^-)$ (d) none of these

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56. Let $f(x)=\frac{\log\left(1+\frac{x}{a}\right)-\log\left(1-\frac{x}{b}\right)}{x}, x\neq 0.$ Find the value of f at $x=0$ so that f becomes continuous at $x=0$

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57. Let $f(x)=\frac{\tan\left(\frac{\pi}{4}-x\right)}{\cot 2x}, x\neq\frac{\pi}{4}$. The value which should be assigned to $f(x)$ at $x=\frac{\pi}{4},$ so that it is continuous everywhere is (a) 1 (b) $\frac{1}{2}$ (c) 2 (d) none of these

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58. The function $f(x) = \frac{x^3 + x^2 - 16x + 20}{x - 2}$ is not defined for $x = 2$.

In order to make $f(x)$ continuous at $x = 2$, $f(2)$ should be defined as

(a)0

(b) 1

(c) 2

(d) 3

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59. The value of b for which the function $f(x) = \{5x - 4, 0x \leq 1$

, $4x^2 + 3bx, 1 < x < 2$

and continuous at $x = 1$

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60. If $f(x)=\frac{1}{1-x}$, then the set of points discontinuity of the function $f(f(f(x)))is\ (a)\{1\}(b)\{0,1\}(c)\{-1,1\}$ (d) none of these

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61. If the function $f(x)$ defined by f(x)=$\frac{\log(1+3x)-\log(1-2x)}{x}$, $x\neq 0$ and k , x=0. Find k.

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62. Show that $f(x)=5x-4$, $0<x<1$ $f(x)=4x^3-3x$, $1<x<2$ continuous at $x=1$

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63. If $f(x)=\left\{a\frac{\sin\pi}{2}(x+1), , x\leq 0\frac{\tan x-\sin x}{x^3}, x>0\right.$ is continuous at $x=0$, then a equal (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$

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64. If $f(x) = \frac{1-\sin x}{(\pi-2x)^2}$,when $x \neq \frac{\pi}{2}$ and $f\left(\frac{\pi}{2}\right) = \lambda,$ the $f(x)$ will be continuous function at $x = \frac{\pi}{2}$,where $\lambda = ?$ (a)$\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) none of these

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65. The value of k which makes $f(x) = \begin{cases} \frac{\sin x}{x}, x \neq 0, & \text{and } k, x = 0 \end{cases}$, continuous at $x = 0$,is (a) 8 (b) 1 (c) -1 (d) none of these

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66. Show that the function $f(x) = 2x - |x|$ is continuous at $x = 0$.

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67. If the function $f(x) = \dfrac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$ is continuous at each point of its domain, then the value of $f(0)$

(A) $\dfrac{4}{3}$ (B) $\dfrac{1}{3}$ (C) $-\dfrac{1}{3}$ (D) $\dfrac{2}{3}$

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68. Let $f(x) = \begin{cases} \dfrac{x-4}{|x-4|a+b} + a, x < 0 \dfrac{x-4}{|x-4|} + b, x > 0 \end{cases}$ Then, $f(x)$ is continuous at $x = 4$ when (a)$a = 0, b = 0$ (b) $a = 1, b = 1$ (c) $a = -1, b = 1$ (d) $a = 1, b = -1$

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69. $Let f(x) = \begin{cases} \dfrac{x^4 - 5x^2 + 4}{|(x-1)(x-2)|} \end{cases}$, x!=1,2 & 6, x=1 & 12 , x = 2 then $f(x)$ is continuous on the set` (a) R (b) R-{1} (c) R-{2} (d) R-{1,2}

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70. The values of the constants a, b and c for which the function $f(x) = \begin{cases}(1+ax)^{1/x}b, x<0\frac{(x+c)^{\frac{1}{3}}-1}{(x+1)^{\frac{1}{2}}-1}, x>0x=0\end{cases}$ may be continuous at $x = 0$, are $a = (\log)_e\left(\frac{2}{3}\right), b = -\frac{2}{3}, c = 1$ $a = \log)e\left(\frac{2}{3}\right), b\frac{2}{3}, c = -1$ $a = (\log)_e\left(\frac{2}{3}\right), b = \frac{2}{3}, c = 1$ (d) none of these

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71. Determine the value of the constant m so that the function $f(x) = \{m(x^2 - 2x), \quad \text{if} \quad x < 0 \cos x, \quad \text{if} \quad x \geq 0$ is continuous.

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72. The value of $f(0)$, so that the function $f(x) = \frac{(27-2x)^{\frac{1}{3}} - 3}{9 - 3(243+5x)^{1/5}} (x \neq 0)$ is continuous, is given by (a) $\frac{2}{3}$ (b) 6 (c) 2 (d) 4

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73. The function $f(x)=\begin{cases}\dfrac{e^{\frac{1}{x}}-1}{e^{\frac{1}{x}}+1}, x\neq 0 0, x=0\end{cases}$ (a)is continuous at $x=0$ (b)is not continuous at $x=0$ (c)is not continuous at $x=0$, but can be made continuous at $x=0$ (d) none of these

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74. The points of discontinuity of the function `f(x)={2sqrt(x),0lt=xlt=1 4-2x,1

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75. If f(x)=$\dfrac{\tan\left(\frac{\pi}{4}-x\right)}{\cot 2x}$ for $x\neq\dfrac{\pi}{4}$, find the value of which can be assigned to f(x) at $x=\dfrac{\pi}{4}$ so that the function f(x) becomes continuous every where in $\left[0, \dfrac{\pi}{2}\right]$

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76. Find the values of $a and b$ so that the function $f(x)$ defined by `f(x)=

{x^2+a x+b,0lt=x<2 3x+2,2lt=xlt=42a x+5b ,4

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77. $f(x) = \begin{cases} \dfrac{\sqrt{1+px} - \sqrt{1-px}}{x}, & -1 \leq x < 0 \dfrac{2x+1}{x-2}, 0 \geq x \geq 1 \end{cases}$ is continuous in the interval $[-1, 1]$, then p is equal to -1 (b) $-\dfrac{1}{2}$ (c) $\dfrac{1}{2}$

(d) 1

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78. The value of $f(0)$ so that the function $f(x) = \dfrac{2 - (256 - 7x)^{\frac{1}{8}}}{(5x+32)^{1/5} - 2}, x \neq 0$ is continuous everywhere, is given by -1 (b) 1 (c) 26 (d) none of these

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79. The function $f(x) = \begin{cases} \frac{\sin 3x}{x}, x \neq 0 \end{cases}$

$\frac{k}{2}, x = 0$ is continuous of $x = 0$,then

$k =$ 3 (b) 6 (d) 9 (d) 12

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80. Discuss the continuity of the function $f(x) = \begin{cases} \frac{\sin 2x}{x}, \quad \text{if} \quad x < 0x + 2, \quad \text{if} \quad x \geq 0 \end{cases}$

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81. Test the continuity of the following function at the origin: $f(x) = \begin{cases} \frac{|x|}{x}; x \neq 0 \end{cases}$

$, 1; x = 0$

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82. Show that the function $f(x)$ given by $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is continuous at x = 0

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83. Show that the function $f(x)$ given by $f(x) = \left\{\frac{\sin x}{x} + \cos x, x \neq 0 \text{ and } 2, x = 0\right.$ is continuous at $x = 0$.

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84. Examination the function $f(t)$ given by $f(x) = \left\{\frac{\cos x}{\frac{\pi}{2} - x};\right.$ for continuity at $x = \frac{\pi}{2}$

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85. Discuss the continuity of the function $f(x)$ given by

$f(x) = \{2 - x, x < 0$

and $2 + x, x > 0$

at $x = 0$

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86. Determine the values of a, b, c for which the function $f(x) = \left\{\frac{\sin(a+1)x + \sin x}{x}\right.$ for $x < 0$, $f(x) = c$ for $x = 0$, $f(x)$= $\frac{\sqrt{x + bx^2} - \sqrt{x}}{bx^{\frac{3}{2}}}$,for $x > 0$ is continuous at $x = 0$

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87. If $f(x) = \left\{\left(\frac{1 - \cos kx}{x \sin x}, x \neq 0\right), \left(\frac{1}{2}, x = 0\right)\right\}$ is continuous at x=0, find k

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88. Discuss the continuity of the function of given by $f(x) = |x - 1| + |x - 2| at x = 1$ and $x = 2$

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89. Determine the value of k for which the following function is continuous at $x = 3$. $f(x) = \begin{cases} \frac{x^2 - 9}{x - 3} \end{cases}$, $x \neq 3$ and k when $x = 3$

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90. Let $f(x) = |x| + |x - 1|$, then

(a) $f(x)$ is continuous at $x = 0$, as well at $x = 1$

(b) $f(x)$ is continuous at $x = 0$, but not at $x = 1$

(c) $f(x)$ is continuous at $x = 1$, but not at $x = 0$

(d) none of these

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91. The function $f(x) = \dfrac{4-x^2}{4x-x^3}$ a)discontinuous at only one point b) discontinuous exactly at two points c)discontinuous exactly at three points d) none of these

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92. If $f(x)$ defined by $f(x) = \begin{cases} \dfrac{|x^2-x|}{x^2-|x|}, x \neq 0, 1-1. \end{cases}$ Then (A)f(x) is continuous for all x (B) for all x except $x=0$ (C) for all x except $x=1$ (D) for all x except $x=0$ and $x=1$

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93. Discuss the continuity of the $f(x)$ at the indicated points: $f(x) = |x|\,|\,|x-1|$ at $x=0,1$ $f(x) = |x-1| + |x+1|$ at $x = -1, 1$

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94. Prove that $f(x) = \sqrt{|x| - x}$ is continuous for all $x \geq 0$.

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95. Given $f(x) = \frac{1}{x-1}\cdot$ Find the points of discontinuity of the composite function $f(f(x))\cdot$

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96. Test the continuity of the following function at the origin: $f(x) = \left\{\frac{|x|}{x}; x \neq 01; x = 0\right.$

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97. Show that the functions $f(x)$ given by $f(x) = \left\{x\frac{\sin 1}{x}, \quad x \neq 00, \right.$ $x = 0$ is continuous at $x = 0$

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98. Show that the function $f(x)$ given by $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x, & x \neq 02, \end{cases}$ $x = 0$ is continuous at $x = 0$.

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99. Examine the function $f(t)$ given by $f(t) = \begin{cases} \frac{\cos t}{\pi/2 - t}; & t \neq \pi/21; \end{cases}$ $t = \pi/2$ for continuity at $t = \pi/2$.

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100. Show that the function $f(x)$ given by $f(x) = \begin{cases} \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1} & whenx \neq 0 \\ 0 & whenx = 0 \end{cases}$

is discontinuous at $x = 0$.

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101. Discuss the continuity of the function $f(x)$ at $x = 1/2$, where `f(x)=

{1//2-x ;\ \ \ \ 0lt=x<1//2 1;\ \ \ \ \ \ \ \ x=1//2 3//2-x ;\ \ \ \ 1//2

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102. Discuss the continuity of the function $f(x)$ given by $f(x) = \{2 - x; \quad x < 22 + x; \quad x \geq 2$ at $x = 2$.

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103. Show that $f(x) = \{5x - 4, \text{ when } 0 < x \leq 1, 4x^3 - 3x$, when $1 < x < 2$ is continuous at $x = 1$.

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104. Show that the function $f(x) = 2x - |x|$ is continuous at $x = 0$.

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105. Discuss the continuity of the function of given by $f(x) = |x - 1| + |x - 2|$ at $x = 1$ and $x = 2$.

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106. Determine the value of k for which the following function is continuous at $x = 3$. $f(x) = \begin{cases} \frac{x^2 - 9}{x - 3}, & x \neq 3k, \quad x = 3 \end{cases}$

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107. Find the value of the constant λ so that the function given below is continuous at $x = -1$

$f(x) = \begin{cases} \frac{x^2 - 2x - 3}{x + 1}, & x \neq -1 \quad \lambda, \quad x = -1 \end{cases}$

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108. Find the value of the constant k so that the function given below is continuous at $x = 0$.

$$f(x) = \begin{cases} \dfrac{1 - \cos 2x}{2x^2}, & x \neq 0 \quad k, & x = 0 \end{cases}$$

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109. Find the value of $'a'$ if the function $f(x)$ defined by $f(x) = \{2x - 1, \quad x < 2 \quad a, \quad x = 2x + 1, \quad x > 2$ is continuous at $x = 2$

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110. If the function $f(x)$ defined by

$$f(x) = \begin{cases} \dfrac{\log(1 + ax) - \log(1 - bx)}{x}, & \text{if} \quad x \neq 0 \quad k, \end{cases}$$

is continuous at $x = 0$, find k.

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111. Find the values of $'a'$ so that the function $f(x)$ defined by

$f(x) = \begin{cases} \dfrac{\sin^2 ax}{x^2}, & x \ne 0 \quad 1, \end{cases} \qquad x = 0$ may be continuous at $x = 0$.

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112. If the function $f(x)$ given by

$f(x) = \{3ax + b, \quad \text{if} \quad x > 1 \quad 11, \qquad \text{if} \quad x = 15ax - 2b, \quad \text{if} \quad x <$

is continuous at $x = -1$, find the values of a and b.

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113. Let

$f(x) = \begin{cases} \dfrac{1 - \cos 4x}{x^2}, & \text{if} \quad x < 0a, \quad \text{if} \quad x = 0 \dfrac{\sqrt{x}}{\sqrt{16 + \sqrt{x}} - 4}, \quad \text{if} \end{cases}$

Determine the value of a so that $f(x)$ is continuous at $x = 0$.

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114. Determine $f(0)$ so that the function $f(x)$ defined by $f(x) = \frac{(4^x - 1)^3}{\frac{\sin x}{4} \log\left(1 + \frac{x^2}{3}\right)}$ becomes continuous at $x = 0$

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115. If $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}$, $x \neq \frac{\pi}{4}$. Find the value of $f\left(\frac{\pi}{4}\right)$ so that $f(x)$ becomes continuous at $x = \pi/4$.

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116. Prove that the greatest integer function $[x]$ is continuous at all points except at integer points.

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117. Leg $f(x + y) = f(x) + f(y) f \text{ or } all x, y \in R,$ If $f(x) is cont \in uous at x = 0, show that f(x)$ is continuous at all $x \cdot$

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118. Show that thefunction $f(x) = |\sin x + \cos x|$ is continuous at $x = \pi$

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119. Test the continuity of the following function at the origin: $f(x) = \begin{cases} \frac{x}{|x|}, & x \neq 01, & x = 0 \end{cases}$

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120. A function $f(x)$ is defined as $f(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3}; & \text{if} \quad x \neq 3 \quad 5; & \text{if} \quad x = 3 \end{cases}$ Show that $f(x)$ is continuous at $x = 3$.

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121. A function $f(x)$ is defined as $f(x) = \begin{cases} \frac{x^2 - 9}{x - 3}; & \text{if } x \neq 3 \\ 6; & \text{if } x = 3 \end{cases}$ Show that $f(x)$ is continuous at $x = 3$.

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122. If $f(x) = \begin{cases} \frac{x^2 - 1}{x - 1}; & f \text{ or } x \neq 1 \\ 2; & f \text{ or } x = 1 \end{cases}$. Find whether $f(x)$ is continuous at $x = 1$.

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123. If $f(x) = \begin{cases} \frac{\sin 3x}{x}, & when\, x \neq 0 \\ 1, & when\, x = 0 \end{cases}$. Find whether $f(x)$ is continuous at $x = 0$.

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124. If $f(x) = \begin{cases} e^{1/x}, & \text{if} \quad x \neq 0 \\ 1, & \text{if} \quad x = 0 \end{cases}$. Find whether f is continuous at $x = 0$

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125. Let $f(x) = \begin{cases} \frac{1 - \cos x}{x^2}, & when\, x \neq 0 \\ 1, & when\, x = 0 \end{cases}$. Show that $f(x)$ is discontinuous at $x = 0$.

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126. Show that $f(x) = \begin{cases} \frac{x - |x|}{2}, & when\, x \neq 0 \\ 2, & when\, x = 0 \end{cases}$ is discontinuous at $x = 0$.

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127. Show that $f(x) = \begin{cases} \frac{|x - a|}{x - a}, & when\, x \neq a \\ 1, & when\, x = a \end{cases}$ is discontinuous at $x = a$

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128. Discuss the continuity of $f(x) = \left\{ |x| \cos\left(\frac{1}{x}\right), \quad x \neq 00, \quad x = 0 \right.$ at $x = 0$

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129. Discuss the continuity of $f(x) = \left\{ x^2 \sin\left(\frac{1}{x}\right), \quad x \neq 0 \quad 0, \quad x = 0 \right.$ at $x = 0$

Watch Video Solution

130. Discuss the continuity of $f(x) = \left\{ (x - a)\sin\left(\frac{1}{x - a}\right), \quad x \neq a \quad 0, \quad x = a \right.$ at $x = a$

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131. $f(x) = \begin{cases} \dfrac{e^x - 1}{\log(1 + 2x)}, & \text{if } x \neq 0 \quad 7, & \text{if } x = 0 \end{cases}$ at $x = 0$

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132. $f(x) = \begin{cases} \dfrac{1 - x^n}{1 - x}, & x \neq 1, \quad n - 1, \quad x = 1 \end{cases}$ $n \in N$ at $x = 1$

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133. $f(x) = \begin{cases} \dfrac{|x^2 - 1|}{x - 1}, & f \text{ or } x \neq 12, \quad f \text{ or } x = 1 \end{cases}$ at $x = 1$

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134. $f(x) = \begin{cases} \dfrac{2|x| + x^2}{x}, & x \neq 0, \end{cases}$ and 0 at $x = 0$ is continuous at x = 0 or not.

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135. $f(x) = \left\{|x-a|\sin\left(\frac{1}{x-a}\right), \quad f \text{ or } \quad x \neq a0, \quad f \text{ or } \quad x = a\right.$ at $x = a$

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136. Show that $f(x) = \left\{1 + x^2, \quad \text{if} \quad 0 \leq x \leq 12 - x, \quad \text{if} \quad x > 1\right.$ is discontinuous at $x = 1$.

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137. Show that $f(x) = \left\{\frac{\sin 3x}{\tan 2x}, \quad \text{if} \quad x < 0\frac{3}{2}, \quad \text{if} \quad x = 0\frac{\log(1+3x)}{e^{2x}-1}, \quad \text{if} \quad x > 0\right.$ is continuous at $x = 0$

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138. Find the value of $'a'$ for which the function f defined by $f(x) = \left\{a\frac{\sin\pi}{2}(x+1), \quad x \leq 0\frac{\tan x - \sin x}{x^3}, \quad x > 0\right.$ is continuous at $x = 0$.

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139. Examine the continuity of the function $f(x) = \{3x - 2, \quad x \leq 0x + 1, \quad x > 0$ at $x = 0$. Also sketch the graph of this function.

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140. Discuss the continuity of the function $f(x) = \{x, \quad x > 01, \quad x = 0 - x, \quad x < 0$ at the point $x = 0$.

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141. Discuss the continuity of the function f(x)= $\begin{cases} x & 0 \leq x < \frac{1}{2}12 \\ 12 & x = \frac{1}{2} \\ 1 - x & \frac{1}{2} < x \leq 1 \end{cases}$

at the point $x = 1/2$.

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142. Discuss the continuity of $f(x) = \{2x - 1, \quad x < 02x + 1, \quad x \geq 0$

at $x = 0$

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143. For what value of k is the function $f(x) = \begin{cases} \frac{x^2 - 1}{x - 1}, & x \neq 1k, \quad x = 1 \end{cases}$ continuous at $x = 1$?

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144. Determine the value of the constant k so that the function $f(x) = \begin{cases} \frac{x^2 - 3x + 2}{x - 1}, & \text{if } x \neq 1k, & \text{if } x = 1 \end{cases}$ is continuous at $x = 1$.

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145. For what value of k is the function $f(x) = \begin{cases} \frac{\sin 5x}{3x}, & \text{if } x \neq 0, \\ k, & \text{if } x = 0 \end{cases}$ continuous at $x = 0$?

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146. Determine the value of the constant k so that the function $f(x) = \begin{cases} kx^2, & \text{if } x \leq 23, & \text{if } x > 2 \end{cases}$ is continuous at $x = 2$.

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147. Determine the value of the constant k so that the function $f(x) = \begin{cases} \frac{\sin 2x}{5x}, & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$.

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148. Find the values of a so that the function $f(x) = \begin{cases} ax + 5, & \text{if } x \leq 2 \\ x - 1, & \text{if } x > 2 \end{cases}$ is continuous at $x = 2$.

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149. Prove that the function $f(x) = \begin{cases} \frac{x}{|x| + 2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$ remains discontinuous at $x = 0$, regardless the choice of k.

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150. Find the value of k if $f(x)$ is continuous at $x = \pi/2$, where

$$f(x) = \begin{cases} \frac{k \cos x}{\pi - 2x}, & x \neq \pi/23, & x = \pi/2 \end{cases}$$

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151. Determine the values of $a,\ b,\ c$ for which the function

$$f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x}, & f \text{ or } x < 0c, & f \text{ or } x = 0\frac{\sqrt{x + bx^2}}{bx^{3/2}}, \end{cases}$$

is continuous at $x = 0$

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152.

$$Iff(x) = \begin{cases} \frac{1 - \cos kx}{x \sin x}, x \neq 0\frac{1}{2}, x = 0is cont \in uousatx = 0, f \in dk. \end{cases}$$

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153. If

$f(x) = \begin{cases} \frac{x-4}{|x-4|} + a, & \text{if} \quad x < 4a + b, \quad \text{if} \quad x = 4\frac{x-4}{|x-4|} + b, & \text{if} \end{cases}$

is continuous at $x = 4$, find $a,\ b$.

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154. For what value of k is the function

$f(x) = \begin{cases} \frac{\sin 2x}{x}, & x \neq 0k, \quad x = 0 \end{cases}$ continuous at $x = 0$?

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155. Let $f(x) = \dfrac{\log\left(1 + \frac{x}{a}\right) - \log\left(1 - \frac{x}{b}\right)}{x}, \quad x \neq 0$. Find the value of f at $x = 0$ so that f becomes continuous at $x = 0$.

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156. If $f(x) = \begin{cases} \dfrac{2^{x+2} - 16}{4^x - 16}, & \text{if} \quad x \neq 2k, \quad \text{if} \quad x = 2 \end{cases}$ is continuous at $x = 2$, find k.

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157. If $f(x) = \begin{cases} \dfrac{\cos^2 x - s \in^2 x - 1}{\sqrt{x^2 + 1} - 1}, & x \neq 0k, \quad x = 0 \end{cases}$ is continuous at $x = 0$, find k.

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158. Extend the definition of the following by continuity $f(x) = \dfrac{1 - \cos 7(x - \pi)}{5(x - \pi)^2}$ at the point $x = \pi$.

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159. If $f(x) = \dfrac{2x + 3\sin x}{3x + 2\sin x}$, $x \neq 0$ is continuous at $x = 0$, then find $f(0)$

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160. Find the values of k for which $f(x) = \begin{cases} \dfrac{1 - \cos 4x}{8x^2}, & when\ x \neq 0k, & when\ x = 0 \end{cases}$ is continuous at $x = 0$.

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161. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \begin{cases} \frac{1 - \cos 2kx}{x^2} & \text{if } x \neq 0 \\ 8 & \text{if } x = 0 \end{cases}$ at $x = 0$

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162. Find the value of the constant k so that the given function is continuous at the indicated point:

$f(x) = \begin{cases} (x-1)\tan\left(\frac{\pi x}{2}\right) & \text{if } x \neq 1 \\ k & \text{if } x = 1 \end{cases}$ at $x = 1$

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163. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \{k(x^2 - 2x), \quad \text{if} \quad x < 0 \cos x, \quad \text{if} \quad x \geq 0$ at $x = 0$

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164. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \{kx + 1, \quad \text{if} \quad x \leq \pi \cos x, \quad \text{if} \quad x > \pi$ at $x = \pi$

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165. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \{kx + 1, \quad \text{if} \quad x \leq 53x - 5, \quad \text{if} \quad x > 5$ at $x = 5$

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166. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \begin{cases} \dfrac{x^2 - 25}{x - 5}, & x \neq 5k, \quad x = 5 \end{cases}$ at $x = 5$

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167. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \{kx^2, \quad x \geq 14, \quad x < 1$ at $x = 1$

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168. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x) = \{k(x^2 + 2), \quad \text{if} \quad x \leq 03x + 1, \quad \text{if} \quad x > 0$ at $x = 0$.

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169. Find the value of the constant k so that the given function is continuous at the indicated point: $f(x)=\begin{cases}\dfrac{x^3+x^2-16x+20}{(x-2)^2}, & x\neq 2k, \quad x=2 \text{ at } x=0\end{cases}.$

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170. Find the values of a and b so that the function f given by `f(x)={1,\ \ \ if\ xlt=3a x+b ,\ \ \ if\ 3

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171. If `f(x)={(x^2)/2\ \ \ ,\ \ \ \ if\ 0lt=xlt=1 2x^2-3x+3/2\ \ \ ,\ \ \ if\ 1

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172. Discuss the continuity of the $f(x)$ at the indicated point: $f(x) = |x| + |x-1|$ at $x = 0,\ 1$.

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173. Discuss the continuity of the $f(x)$ at the indicated point: $f(x) = |x-1| + |x+1|$ at $x = 1$.

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174. Prove that $f(x) = \begin{cases} \frac{x - |x|}{x} & x \neq 0 \\ 2 & x = 0 \end{cases}$ is discontinuous at $x = 0$.

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175. If $f(x) = \{2x^2 + k \quad , \quad \text{if} \quad x \geq 0 - 2x^2 + k \quad , \quad \text{if} \quad x < 0$, then what should be the value of k so that $f(x)$ is continuous at $x = 0$.

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176. For what value of λ is the function

$f(x) = \{\lambda(x^2 - 2x) \quad , \quad \text{if} \quad x \leq 04x + 1 \quad , \quad \text{if} \quad x > 0$

continuous at $x = 0$? What about the continuity at $x = \pm 1$?

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177. For what value of k is the following function continuous at $x = 2$?

$f(x) = \{2x + 1 \;\; ; \quad \text{if} \quad x < 2k \;\; ; \quad x = 23x - 1 \;\; ; \quad x > 2$

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178. Let $f(x) = \left\{ \frac{1 - \sin^3 x}{3\cos^2 x} \quad , \quad \text{if} \quad x\frac{\pi}{2} \right.$. If $f(x)$ is continuous at $x = \frac{\pi}{2}$, find a and b.

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179. If the functions $f(x)$, defined below is continuous at $x = 0$, find the value of k: $f(x) = \begin{cases} \frac{1 - \cos 2x}{2x^2} &, & x < 0k &, & x = 0, \frac{x}{|x|} &, & x > 0 \end{cases}$

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180. Find the relationship between $'a'$ and $'b'$ so that the function $'f'$ defined by $f(x) = \{ax + 1 \quad , \quad \text{if} \quad x \leq 3bx + 3 \quad , \quad \text{if} \quad x > 3$ is continuous at $x = 3$.

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181. If a function f is defined as $f(x) = \begin{cases} \frac{|x - 4|}{x - 4} &, & x \neq 40 &, & x = 4 \end{cases}$

Show that f is everywhere continuous except at $x = 4$.

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182. Discuss the continuity of the function $f(x) = \begin{cases} \frac{\sin 2x}{x}, & \text{if } x < 0 x + 2, \quad \text{if } x \geq 0 \end{cases}$

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183. Discuss the continuity of the function $f(x) = \begin{cases} \frac{|x|}{x} & , \quad \text{if } x \neq 0 0 \quad , \quad \text{if } x = 0 \end{cases}.$

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184. Discuss the continuity of the function $f(x)$ given by $f(x) = \{2x - 1, \quad \text{if } x < 0 2x + 1, \quad \text{if } x \geq 0$

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185. Show that the function f defined by $f(x) = |1 - x + |x||$ is everywhere continuous.

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186. Prove that $f(x) = \sqrt{|x| - x}$ is continuous for all $x \geq 0$.

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187. Given $f(x) = \frac{1}{x - 1}$. Find the points of discontinuity of the composite function $f(f(x))$.

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188. Determine the value of the constant k so that the function $f(x) = \{kx^2 \quad , \quad \text{if} \quad x \leq 23 \quad , \quad \text{if} \quad x > 2$ is continuous.

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189. Determine the value of the constant m so that the function $f(x) = \{m(x^2 - 2x) \quad , \quad \text{if} \quad x < 0 \cos x \quad , \quad \text{if} \quad x \geq 0$ is continuous.

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190. If `f(x)={1\ \ \ ,\ \ \ if\ xlt=3a x+b\ \ \ ,\ \ \ if\ 3

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191. Prove that the function $f(x) = \left\{ \frac{\sin x}{x} \quad , \quad x < 0x + 1 \quad , \quad x \geq 0 \right.$ is everywhere continuous.

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192. Discuss the continuity of the function `fx)={x/(|x|)\ \ \ ,\ \ \ x!=0 0\ \ \ ,\ \ \ x=0 .

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193. Find the points of discontinuity, if any, of the following function:

$f(x) = \{x^3 - x^2 + 2x - 2 \quad , \quad \text{if} \quad x \neq 14 \quad , \quad \text{if} \quad x = 1$

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194. Find the points of discontinuity, if any, of the following function:

$f(x) = \left\{\frac{x^4 - 16}{x - 2} \quad , \quad \text{if} \quad x \neq 216 \quad , \quad \text{if} \quad x = 2\right.$

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195. Find the points of discontinuity, if any, of the following function:

$f(x) = \left\{\frac{\sin x}{x} \quad , \quad \text{if} \quad x < 02x + 3 \quad , \quad x \geq 0\right.$

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196. Find the points of discontinuity, if any, of the following function:

$$f(x) = \begin{cases} \frac{\sin 3x}{x}, & \text{if } x \neq 04, \quad \text{if } x = 0 \end{cases}$$

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197. Find the points of discontinuity, if any, of the following function:

$$f(x) = \begin{cases} \frac{\sin x}{x} + \cos x, & \text{if } x \neq 05, \quad \text{if } x = 0 \end{cases}$$

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198. Find the points of discontinuity, if any, of the following function:

$$f(x) = \begin{cases} \frac{x^4 + x^3 + 2x^2}{tan^{-1}x}, & \text{if } x \neq 010, \quad \text{if } x = 0 \end{cases}$$

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199. Find the points of discontinuity, if any, of the following function:

$$f(x) = \begin{cases} \frac{e^x - 1}{(\log)_e(1 + 2x)}, & \text{if } x \neq 07, \quad \text{if } x = 0 \end{cases}$$

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200. Find the points of discontinuity, if any, of the following function:

$f(x) = \{|x-3|\ ,\quad \text{if}\quad x \geq 1 \frac{x^2}{4} - \frac{3x}{2} + \frac{13}{4}\ ,\quad \text{if}\quad x < 1$

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201. Find the points of discontinuity, if any, of the following function: `f(x)=

{|x|+3\ \ \ ,\ \ \ if\ xlt=-3-2x\ \ \ ,\ \ \ if-33`

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202. Find the points of discontinuity, if any, of the following function:

$f(x) = \{x^{10} - 1\ ,\quad \text{if}\quad x \leq 1 x^2\ ,\quad \text{if}\quad x > 1$

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203. Find the points of discontinuity, if any, of the following function:

$f(x) = \{2x \quad , \quad \text{if} \quad x < 00 \quad , \quad \text{if} \quad 0 \leq x \leq 14x \quad , \quad \text{if} \quad x > 1$

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204. Find the points of discontinuity, if any, of the following function:

$f(x) = \{s \in \ x - \cos x \quad , \quad \text{if} \quad x \neq 0 - 1 \quad , \quad \text{if} \quad x = 0$

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205. Find the points of discontinuity, if any, of the following function:

`f(x)={-2\ \ \ ,\ \ \ if\ xlt=-1 2x\ \ \ ,\ \ \ if-1

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206. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous:

$f(x) = \left\{ \frac{\sin 2x}{5x} \quad , \quad \text{if} \quad x \neq 03k \quad , \quad \text{if} \quad x = 0 \right.$

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207. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous:

$f(x) = \{kx + 5 \quad , \quad \text{if} \quad x \leq 2x - 1 \quad , \quad \text{if} \quad x > 2$

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208. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous:

$f(x) = \{k(x^2 + 3) \quad , \quad \text{if} \quad x < 0 \text{ and } \quad \cos 2x \quad , \quad \text{if} \quad x \geq 0$

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209. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous: `f(x)={2\ \ \ ,\ \ \ if\ xlt=3a x+b\ \ \ ,\ \ \

if\ 3

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210. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous:

$f(x) = \{4 \quad , \quad \text{if} \quad x \leq -1, \quad ax^2 + b \quad , \quad \text{if} \quad x > -1$

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211. Find the value of k, for which $f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x} & \text{if} \quad -1 \leq x < 0 \\ \frac{2x+1}{x-1} & 0 \leq x < 1 \end{cases}$ is continuous at $x = 0$

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212. Determine the value(s) of constant(s) involved in the definition so that the given function is continuous:

$f(x) = \{5 \quad , \quad \text{if} \quad x \leq 2, \quad ax + b \quad , \quad \text{if} \quad x > 2$

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213. Find the value of k so that the function f defined by $f(x) = \begin{cases} \frac{k \cos x}{\pi - 2x}, 3 \end{cases}$, $\text{if } x \neq \frac{\pi}{2} \text{if } x = \frac{\pi}{2}$ is continuous at $x = \frac{\pi}{2}$

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214. The function $f(x) = \begin{cases} \frac{x^2}{a} \end{cases}$, $\text{if } \quad 0 \leq x < 1, \quad a$, $\text{if } \quad 1 \leq x$ is continuous then find the value of constent term

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215.

$f(x) = \left\{ x + \sqrt{2}a \sin x, 0 < x < \frac{\pi}{4} \text{ and } 2x \cot x + b, \frac{\pi}{4} \leq x < \frac{\pi}{2} \text{ and } c\right.$

. Determine the value of a and b If function is continuous for interval $[0, \pi]$

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216. The function $f(x)$ is defined by $f(x) = \{x^2 + ax + b \quad , \quad 0 \leq x < 2, \quad 3x + 2 \quad , \quad 2 \leq x \leq 4, \quad 2ax + 5b$

f is continuous them determine the value of a and b

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217. If $f(x) = \dfrac{\tan\left(\frac{\pi}{4} - x\right)}{\cot 2x}$ for $x \neq \dfrac{\pi}{4}$, find the value which can be assigned to $f(x)$ at $x = \dfrac{\pi}{4}$ so that the function $f(x)$ becomes continuous every where in $\left[0, \dfrac{\pi}{2}\right]$.

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218. Discuss the continuity of the function $f(x) = \begin{cases} 2x - 1\frac{3x}{2} \end{cases}$

, if $x < 2$, if $x \geq 2$

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219. Discuss the continuity of $f(x) = \sin|x|$.

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220. Prove that the function $f(x) = \begin{cases} \frac{\sin x}{x} \end{cases}$, $x < 0x + 1$, $x \geq 0$

is everywhere continuous.

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221. Show that the function defined by $g(x) = x - [x]$ is discontinuous at all integral points which [x] denotes the greatest integer function.

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222. Discuss the continuity of $f(x) = \sin x + \cos x$

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223. Discuss the continuity of $f(x) = \sin x - \cos x$

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224. Discuss the continuity of $f(x) = \sin x \cos x$

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225. Show that the function defined by $f(x) = \cos(x^2)$ is a continuous function.

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226. Show that the function defined by $f(x) = |\cos x|$is a continuous function.

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227. Find all the points of discontinuity of f defined by $f(x) = | \ |x+1|$.

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228. Determine if f defined by $f(x) = \{x^2 \frac{\sin 1}{x}, \quad \text{if} \quad x \neq 00, \quad \text{if} \quad x = 0$

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229. Given the function $f(x) \frac{1}{x+2}$. Find the points of discontinuity of the function $f(f(x))$

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230. Find all point of discontinuity of the function $f(t) = \frac{1}{t^2 + t - 2}$, where $t = \frac{1}{x - 1}$

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231. Define continuity of a function at a point.

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232. What happens to a function $f(x)$ at $x = a$, if $(\lim)_{x \to a} f(x) = f(a)$

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233. Find $f(0)$, so that $f(x)=\frac{x}{1-\sqrt{1-x}}$ becomes continuous at $x=0$.

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234. The function $f(x)=\begin{cases}\frac{\sin 3x}{x} & x\neq 0\\ \frac{k}{2} & x=0\end{cases}$ is continuous of $x=0, thenk=$ (a) 3 (b) 6 (d) 9 (d) 12

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235. If the function $f(x)=\frac{\sin 10x}{x}$, $x\neq 0$ is continuous at $x=0$, find $f(0)$.

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236. If $f(x)=\begin{cases}\frac{x^2-16}{x-4}\end{cases}$, if $x\neq 4k$, if $x=4$ is continuous at $x=4$, find k.

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237. Determine whether $f(x) = \begin{cases} \frac{\sin x^2}{x} , & x \neq 00 , & x = 0 \end{cases}$ is continuous at $x = 0$ or not.

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238. If $f(x) = \begin{cases} \frac{1 - \cos x}{x^2} , & x \neq 0k , & x = 0 \end{cases}$ is continuous at $x = 0$, find $k \cdot$

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239. If $f(x) = \begin{cases} \frac{\sin^{-1} x}{x} , & x \neq 0k , & x = 0 \end{cases}$ is continuous at $x = 0$, write the value of $k \cdot$

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240. The function $f(x)=\frac{4-x^2}{4x-x^3}$ discontinuous at only one point discontinuous exactly at two points discontinuous exactly at three points none of these

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241. If $f(x)=\left|(\log)_{10}x\right|, thenatx=1$ $f(x)$ is continuous and $f'\left(1^+\right)=(\log)_{10}e$ $f(x)$ is continuous and $f'\left(1^+\right)=(\log)_{10}e$ $f(x)$ is continuous and $f'\left(1^-\right)=(\log)_{10}e$ $f(x)$ is continuous and $f'\left(1^-\right)=-(\log)_{10}e$

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242. If $f(x)=\left\{\frac{36^x-9^x-4^x+1}{\sqrt{2}-\sqrt{1+\cos x}}, x\neq 0k, x=0\right.$ is continuous at $x=0,$ then k equal $16\sqrt{2}\log 2\log 3$ (b) $16\sqrt{2}\in 6$ $16\sqrt{2}\in 2In3$ (d) none of these

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243. If $f(x)$ defined by $f(x) = \begin{cases} \frac{|x^2 - x|}{x^2 - |x|}, x \neq 0, 1 - 1 \end{cases}$. Then (A)f(x) is continuous for all x (B) for all x except $x = 0$ (C) for all x except $x = 1$ (D) for all x except $x = 0$ and $x = 1$

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244. If $f(x) = \begin{cases} \frac{1}{(\pi - 2x)^2} \frac{\log \sin x}{(\log(1 + \pi^2 - 4\pi x + 4x^2)), x \neq \frac{\pi}{2} k, x = \frac{\pi}{2}} \end{cases}$ is continuous at $x = \frac{\pi}{2}, thenk = -\frac{1}{16}$ (b) $-\frac{1}{32}$ (c) $-\frac{1}{64}$ (d) $-\frac{1}{28}$

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245. If $f(x) = (x + 1)^{\cot x}$ be continuous at $x = 0$, the $f(0)$ is equal to 0 (b) $\frac{1}{e}$ (c) e (d) $noneofthese$

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246. If $f(x) = \begin{cases} \frac{\log(1+ax) - \log(1-bx)}{x}, & x \neq 0, \\ k, & x = 0 \end{cases}$ and $f(x)$ is continuous at $x = 0$, then the value of k is $a - b$ (b) $a + b$ (c) $\log a + \log b$ (d) none of these

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247. The function $f(x) = \begin{cases} \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1}, x \neq 00, x = 0 \end{cases}$ is continuous at $x = 0$ is not continuous at $x = 0$ is not continuous at $x = 0,$ but can be made continuous at $x = 0$ (d) none of these

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248. Let $f(x) = \begin{cases} \frac{x-4}{|x-4|} + a, x < 4a + b, \frac{x-4}{|x-4|} + b, x > 4 \end{cases}$ Then $f(x)$ is continous at $x = 4$ when $a = 0, b = 0$ b. $a = 1, b = 1$ c. $a = -1, b = 1$ d. $a = -1, b = -1$

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249. If the function $f(x) = \{(\cos x)^{\frac{1}{x}}, x \neq 0k, x = 0$ is continuous at $x = 0$, then the value of k is 0 (b) 1 (c) -1 (d) e

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250. Let $f(x) = |x| + |x - 1|,$ then (a)$f(x)$ is continuous at $x = 0,$ as well at $x = 1$ (b)$f(x)$ is continuous at $x = 0,$ but not at $x = 1$ (c)$f(x)$ is continuous at $x = 1,$ but not at $x = 0$ (d)none of these

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251. Let $f(x) = \left\{\frac{x^4 - 5x^2 + 4}{|(x-1)(x-2)|}, \quad x \neq 1,\ 16 \quad , \quad x = 1, \quad 12, \quad x =\right.$. Then, $f(x)$ is continuous on the set R (b) $R - \{1\}$ (c) $R - \{2\}$ (d) $R - \{1,\ 2\}$

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252. If $f(x) = f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x^x c}, x < 0 \frac{\sqrt{x + bx^2} - \sqrt{x}}{bx\sqrt{x}}, x \geq 0, x - \end{cases}$ is continuous at $x = 0, then$ $a = -\frac{3}{2}, b = 0, c = \frac{1}{2}$ (b) $a = -\frac{3}{2}, b = 1, c = -\frac{1}{2}$ $a = -\frac{3}{2}, b \in R - [0], c = \frac{1}{2}$ (d) none of these

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253. If $f(x) = \{mx + 1 \;, \; x \leq \frac{\pi}{2}, \quad \sin x + n \;, \; x > \frac{\pi}{2}$ is continuous at $x = \frac{\pi}{2}$, then $m = 1, \; n = 0$ (b) $m = \frac{n\pi}{2} + 1$ (c) $n = \frac{m\pi}{2}$ (d) $m = n = \frac{\pi}{2}$

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254. The value of $f(0)$, so that the function $f(x) = \frac{\sqrt{a^2 - ax + x^2} - \sqrt{a^2 + ax + x^2}}{\sqrt{a + x} - \sqrt{a - x}}$ becomes continuous for all x, given by $a^{\frac{3}{2}}$ (b) $a^{\frac{1}{2}}$ (c) $-a^{\frac{1}{2}}$ (d) $-a^{\frac{3}{2}}$

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255. The value of $f(0)$, so that the function $f(x)=\frac{(27-2x)^{\frac{1}{3}}-3}{9-3(243+5x)^{1/5}}(x\neq 0)$ is continuous, is given by (a) $\frac{2}{3}$ (b) 6 (c) 2 (d) 4

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256. The value of $f(0)$ so that the function $f(x)=\frac{2-(256-7x)^{\frac{1}{8}}}{(5x+32)^{1/5}-2}, x\neq 0$ is continuous everywhere, is given by -1 (b) 1 (c) 26 (d) none of these

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257. $f(x)=\begin{cases}\frac{\sqrt{1+px}-\sqrt{1-px}}{x}, & -1\leq x<0\frac{2x+1}{x-2}, 0\geq x\geq 1\end{cases}$ is continuous in the interval $[-1, 1]$, then p is equal to -1 (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) 1

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258. The function $f(x) = \{x^2 a \quad , \quad 0 \leq x < 1, \quad a, \quad 1 \leq x$ is continuous then find the value of constant term

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259. If $f(x) = \frac{1 - \sin x}{(\pi - 2x)^2}, when x \neq \frac{\pi}{2} and f\left(\frac{\pi}{2}\right) = \lambda,$ the $f(x)$ will be continuous function at $x = \frac{\pi}{2}, where \lambda = \frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) none of these

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260. The value of a for which the function $f(x) = f(x) = \left\{ \frac{(4^x - 1)\hat{3}}{\sin(xa)\log\{(1 + x^2 3)\}}, x \neq 012(\log 4)^3, x = 0 \right.$ may be continuous at $x = 0$ is 1 (b) 2 (c) 3 (d) none of these

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261. The function $f(x) = \tan x$ is discontinuous on the set $\{n\pi; n \in Z\}$

(b) $\{2n\pi n \in Z\}$ $\left\{(2n+1)\frac{\pi}{2} : n \in Z\right\}$ (d) $\left\{\frac{n\pi}{2} : n \in Z\right\}$

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262. The function $f(x) = \left\{\frac{\sin 3x}{x}, x \neq 0\frac{k}{2}, x = 0\right.$ is continuous of $x = 0, thenk =$ 3 (b) 6 (d) 9 (d) 12

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263. If the function $f9x\Big) = \frac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$ is continuous at each point of its domain, then the value of $f(0)$ 2 (b) $\frac{1}{3}$ (c) $-\frac{1}{3}$ (d) $\frac{2}{3}$

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264. If $f(x)=\frac{1}{1-x}$, then the set of points discontinuity of the function $f(f(f(x)))is$ {1} (b) {0,1} (c) {-1,1} (d) none of these

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265. Let $f(x)=\frac{\tan\left(\frac{\pi}{4}-x\right)}{\cot 2x}, x\neq\frac{\pi}{4}$. The value which should be assigned to $f(x)$ at $x=\frac{\pi}{4}$, so that it is continuous everywhere is 1 (b) $\frac{1}{2}$ (c) 2 (d) none of these

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266. The function $f(x)=\frac{x^3+x^2-16x+20}{x-2}$ is not defined for $x=2$. In order to make $f(x)$ continuous at $x=2, f(2)$ should be defined as 0 (b) 1 (c) 2 (d) 3

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267. If $f(x) = \begin{cases} a\frac{\sin\pi}{2}(x+1), , x \leq 0\frac{\tan x - \sin x}{x^3}, x > 0 \end{cases}$ is continuous at $x = 0$, then a equal $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$

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268. If `f(x)={a x^2+b\ \ \ ,\ \ \ 0lt=x<1 4\ \ \ ,\ \ \ x=1x+3\ \ \ ,\ \ \ 1

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269. If the function $f(x)$ defined by $f(x) = \begin{cases} \frac{\log(1+3x) - \log(1-2x)}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at $x = 0$, then $k =$ (a) 1 (b) 5 (c) -1 (d) none of these

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270. If $f(x) = \begin{cases} \frac{1-\cos 10x}{x^2}, & x < 0a, & x = 0\frac{\sqrt{x}}{\sqrt{625+\sqrt{x}}-25}, & x > 0 \end{cases}$

, then the value of a so that $f(x)$ may be continuous at $x = 0$, is (a) 25 (b) 50 (c) -25 (d) none of these

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271. If $f(x) = x \sin\left(\frac{1}{x}\right), \ x \neq 0$, then the value of the function at $x = 0$, so that the function is continuous at $x = 0$, is (a) 0 (b) -1 (c) 1 (d) indeterminate

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272. The value of k which makes $f(x) = \left\{\frac{\sin 1}{x}, x \neq 0k, x = 0cont \in uousatx = 0, is\right.$ 8 (b) 1 (c) -1 (d) none of these

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273. The values of the constants $a, bandc$ for which the function $f(x) = \begin{cases}(1+ax)^{1/x}b, x<0\dfrac{(x+c)^{\frac{1}{3}}-1}{(x+1)^{\frac{1}{2}}-1}, x>0x=0\end{cases}$ may be continuous at $x=0$, are $a=(\log)_e\left(\dfrac{2}{3}\right), b=-\dfrac{2}{3}, c=1$ $a=\log)e$ $\left(\dfrac{2}{3}\right), b\dfrac{2}{3}, c=-1$ $a=(\log)_e\left(\dfrac{2}{3}\right), b=\dfrac{2}{3}, c=1$ (d) none of these

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274. The points of discontinuity of the function $f(x) = \{2\sqrt{x} \quad , \quad 0 \le x \le 1, \quad 4-2x \quad , \quad 1<x$

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275. If `f(x){(1-sin^2x)/(3cos^2x),xpi/2t h e nf(x)$isc$o$nt \in uousat$x=pi/2,if a=1/3,b=2$(b)$a=1/3,=8/3a=2/3,b=8/3` (d0 none of these

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276. The points of discontinuity of the function $f(x) = \left\{ \frac{1}{5}\left(2x^2+3\right),\ \ x \le 1,\ \ 6-5x,\ \ 1 < x \right.$

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277. If $f(x) = \begin{cases} \dfrac{\sin(\cos x) - \cos x}{(\pi - 2x)^2}, & x \ne \dfrac{\pi}{2} \\ k, & x = \dfrac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, then k is equal to (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) -1

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Others

1. If $f(x) = \left|(\log)_{10} x\right|, thenatx = 1$ a. $f(x)$ is continuous and $f'(1) = (\log)_{10} e$ b. $f(x)$ is continuous and $f'(1) = -(\log)_{10} e$ c. $f(x)$

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