MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

LIMIT AND CONTINUITY

Multiple Choice Questions Level I

1. $\lim_{x \to 0} \frac{\sin x}{x(1+\cos x)}$ is equal to :

A. 0

B. $\frac{1}{2}$

C. 1

D. -1

Answer: B

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2. $\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin x}{\cos x}$ is equal to :

A. 0

B. -1

C. 1

D. Does not exist

Answer: A

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3. $\lim_{x \to 0} \frac{|x|}{x}$ is equal to :

A. 1

B. -1

C. 0

D. Does not exist

Answer: D

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4. $\lim_{x \to 1} [x - 1]$, where $[\cdot]$ is the greatest integer function is equal to :

A. 1

B. 2

C. 0

D. Does not exist

Answer: D

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5. $\lim_{x \to 0} x \sin \frac{1}{x}$ is equal to :

A. 0

B. 1

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

D. Does not exist

Answer: A

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6. $\lim_{n \to \infty} \frac{1 + 2 + 3 + \ldots\ldots + n}{n^2}, n \in N$ is equal to :

A. 0

B. 1

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

D. $\frac{1}{4}$

Answer: C

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7. $\lim_{x \to 0} \frac{\sin x}{\sqrt{x+1} - \sqrt{1-x}}$ is :

A. 2

B. 0

C. 1

D. -1

Answer: C

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8. $\lim_{x \to 1} \frac{\left(\sqrt{x} - 1\right)(2x - 3)}{2x^2 + x - 3}$ is :

A. $\frac{1}{10}$

B. $-\frac{1}{10}$

C. 1

D. Does not exist

Answer: B

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9. Let $f(x) = \begin{cases} x^2 - 1 & 0 < x < 2 \\ 2x + 3 & 2 \leq x < 3 \end{cases}$, the quadratic equation whose roots are $\lim_{x \to 2^-} f(x)$ and $\lim_{x \to 2^+} f(x)$ is :

A. $x^2 - 6x + 9 = 0$

B. $x^2 - 7x + 8 = 0$

C. $x^2 - 14x + 49 = 0$

D. $x^2 - 10x + 21 = 0$

Answer: D

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10. $\lim_{x \to 0} \frac{\tan 2x - x}{3x - \sin x}$, is :

A. 2

B. $\frac{1}{2}$

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

D. $\frac{1}{4}$

Answer: B

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11. $\lim_{x \to 1} \frac{\log_e x}{x - 1}$ equals :

A. 0

B. 1

C. 2

D. $\frac{1}{2}$

Answer: B

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12. $\lim_{x \to \infty} \frac{(2x-3)(3x-4)}{(4x-5)(5x-6)}$ equals :

A. 0

B. $\frac{1}{10}$

C. $\frac{1}{5}$

D. $\frac{3}{10}$

Answer: D

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13. $\lim_{x \to 0} \left(\frac{x}{\tan^{-1} 2x} \right)$ is :

A. 0

B. $\frac{1}{2}$

C. 1

D. ∞

Answer: B

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14. $\lim_{x \to \infty} \left(\frac{x+6}{x+1} \right)^{x+4}$ is :

A. 0

B. 1

C. e^4

D. e^5

Answer: D

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15. $\lim_{x \to 0} \frac{a^x - 1}{\sqrt{1+x} - 1}$ is :

A. $2 \log_e a$

B. $\frac{1}{2} \log_e a$

C. $a \log_e 2$

D. None of these

Answer: A

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16. $\lim_{x \to 0} \frac{x^2 \sin(1/x)}{\sin x}$ is :

A. 1

B. 0

C. -1

D. Does not exist

Answer: B

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17. $\lim_{n \to \infty} \left(\frac{1}{1-n^2} + \frac{2}{1-n^2} + \ldots\ldots + \frac{n}{1-n^2} \right)$ is :

A. 0

B. $-\frac{1}{2}$

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

D. None of these

Answer: B

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18. The value of $\lim_{x \to 0} \frac{\sqrt{\frac{1}{2}(1-\cos 2x)}}{x}$ is :

A. 1

B. -1

C. 0

D. None of these

Answer: D

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19. $\lim_{\theta \to 0} \frac{\text{cosec}\theta - \cot\theta}{\theta}$ is :

A. $\frac{-1}{2}$

B. ∞

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

D. 0

Answer: C

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20. $\lim_{x \to 0} \left(\frac{1 + \tan x}{1 - \tan x} \right)^{1/x}$ is :

A. 0

B. 1

C. e^2

D. None of these

Answer: C

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21. $\lim_{n \to \infty} \frac{1}{n^3} \sum_{r=1}^{n} r^2$ is :

A. $\frac{1}{4}$

B. $1/3$

C. $1/2$

D. None of these

Answer: B

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22. $\lim_{x \to \infty} \frac{1}{n^4} \sum_{r=1}^{n} r^3$ is :

A. $\frac{1}{4}$

B. $1/3$

C. $1/2$

D. None of these

Answer: A

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23. If f be a function such that f(9) = 9 and f'(9) = 3, then :

$\lim_{x \to 9} \frac{\sqrt{f(x)} - 3}{\sqrt{x} - 3}$ is :

A. 1

B. 9

C. 3

D. None of these

Answer: C

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24. $\lim_{x \to 0} \left(\frac{\tan x - x}{x} \right) \sin \left(\frac{1}{x} \right)$ is :

A. a real number other than 0 and 1

B. 0

C. 1

D. None of these

Answer: C

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25. $\lim_{n \to \infty} \left(\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots . + \frac{1}{n(n+1)} \right)$ is :

A. 1

B. $2/3$

C. $1/3$

D. 0

Answer: A

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26. If a, b, c, d are +ve, then :

$\lim_{x \to \infty} \left(1 + \frac{1}{a+bx} \right)^{c+dx}$ is equal to :

A. e

B. $e^{(c+d)(a+b)}$

C. $e^{d/b}$

D. $e^{c/a}$

Answer: C

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27. $\lim_{x \to 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$ is :

A. 2

B. -2

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

D. $\frac{-1}{2}$

Answer: C

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28. $\lim_{x \to 1} \frac{\sqrt{1 - \cos 2(x-1)}}{x-1}$:

A. exists and it equals $\sqrt{2}$

B. exists and it equals $-\sqrt{2}$

C. does not exist because $x - 1 \to 0$

D. does not exist as LHL is not equal to RHL

Answer: D

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29. If $f(x) = \frac{\sin[x]}{[x]}, [x] \neq 0 = 0, [x] = 0,$ where [x] denotes the greatest integer less than or equal to x, than $\lim_{x \to 0} f(x)$ equals :

A. 1

B. 0

C. -1

D. None of these

Answer: D

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30. $\lim_{x \to 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{2/x}$ is equal to :

A. 0

B. $(abc)^{2/3} (a, b, c > 0)$

C. abc

D. $\sqrt{\text{a b c}}$

Answer: B

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31. $\lim_{x \to 2} \frac{\sqrt{1 + \sqrt{2 + x}} - \sqrt{3}}{x - 2}$ is equal to :

A. $\frac{1}{8\sqrt{3}}$

B. $\frac{1}{4\sqrt{3}}$

C. 0

D. None of these

Answer: A

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32. The value of constants a and b, so that :

$\lim_{x \to \infty} \left[\frac{x^2+1}{x+1} - ax - b \right] = 0$, is :

A. a = 0, b = 0

B. a = 1, b = - 1

C. a = - 1, b = 1

D. a = 2, b = - 1

Answer: B

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33. $\lim_{x \to \infty} \frac{\sqrt{x^2+1} - \sqrt[3]{x^3+1}}{\sqrt[4]{x^4+1} - \sqrt[5]{x^4+1}}$ equals :

A. -1

B. 0

C. 1

D. None of these

Answer: B

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34. The value of $\lim_{x \to 0} \left(\frac{1+5x^2}{1+3x^2} \right)^{1/x^2}$ is :

A. e^2

B. e

C. e^{-1}

D. None of these

Answer: A

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35. The value of $\lim_{x \to 0} \frac{l_n(1+2h) - 2l_n(1+h)}{h^2}$ is :

A. 1

B. -1

C. 0

D. None of these

Answer: B

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36. Let f(x) = sgn (sgn (sgn x)). Then $\lim_{x \to 0} f(x)$ is :

A. 0

B. 1

C. 2

D. None of these

Answer: D

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37. $\lim_{x \to 0} \frac{\sin[\cos x]}{1 + [\cos x]}$ equals :

A. 0

B. 1

C. does not exist

D. None of these

Answer: A

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38. The function $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & \text{if } x \neq 0 \\ k & \text{if } x = 0 \end{cases}$ is continuous at x = 0, then value of k is :

A. 3

B. 2

C. 1

D. 1.5

Answer: B

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39. The number of points at which the function $f(x) = \frac{1}{x - [x]}$ is :

A. 1

B. 2

C. 3

D. None of these

Answer: D

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40. The value of k which makes the function defined by :

$$f(x) = \begin{cases} \sin\frac{1}{x} & \text{if} \quad x \neq 0 \\ k & \text{if} \quad x = 0 \end{cases}$$ continuous at x = 0 is :

A. 8

B. 1

C. -1

D. None of these

Answer: D

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41. If $f(x) = x^2 \sin \frac{1}{x}$, where $x \neq 0$, then the value of the function 'f' at x = 0, so that the function is continuous at x = 0, is :

A. 0

B. -1

C. 1

D. None of these

Answer: A

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42. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at x = 0. The value which should be assigned to f at x = 0 so that it is continuous at x = 0 is :

A. a - b

B. a + b

C. log a + log b

D. None of these

Answer: B

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43. $f(x) = \frac{\sqrt{1+px} - \sqrt{1-px}}{x}, -1 \leq x \leq 0 = \frac{2x+1}{x-2}, 0 \leq x \leq 1$ is continuous in the interval [-1, 1], then p is :

A. -1

B. $-\frac{1}{2}$

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

D. 1

Answer: B

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44. The function $f(x) = \frac{x^2}{a}$, if $0 \leq x \leq 1$

=a, if $1 \leq x < \sqrt{2}$

$= \frac{2b^2 - 4b}{x^2}$, if $\sqrt{2} \leq x < \infty$

is continuous for $0 \leq x < \infty$, then the most suitable values for a and b are :

A. a = 1, b = - 1

B. $a = -1, b = 1 + \sqrt{2}$

C. a = - 1, b = 1

D. None of these

Answer: C

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45. Let $f(x) = \begin{bmatrix} x^2 & x \leq 0 \\ ax + b & x > 0 \end{bmatrix}$ lim The values of a and b for which the function f(x) is continuous on the whole real line is :

A. a = 1, b = 0

B. a = 0, b = 1

C. a = 0, b = 2

D. b = 0, any real

Answer: D

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46. If $f(x) = \frac{2 - (256 - 7x)^{1/8}}{(5x + 32)^{1/5} - 2}, x \neq 0$, then for f to be continuous everywhere, f(0) is equal to :

A. 2^4

B. 1

C. -1

D. None of these

Answer: D

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47. If $f(x) = \frac{\sin\left(e^{x-2} - 1\right)}{\log(x-1)}$, then $\lim_{x \to 2} f(x)$ is given by :

A. 0

B. 1

C. -2

D. -1

Answer: B

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48. The function $f(x) = \frac{[\log(1+ax) - \log(1-bx)]}{x}$ is not defined at x = 0. The value, which should be assrgned to f at x = 0. The value, which should be assrgned to f at x = 0 so that it is continuous at x = 0 is :

A. a + b

B. a - b

C. log a + log b

D. None of these

Answer: A

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49. If the function $f(x) = \begin{cases} \frac{x^2-(a+2)x+a}{x-2} & x \neq 2 \\ 2 & x = 2 \end{cases}$ is continuous at x = 2, then :

A. a = - 1

B. a = 0

C. a = 1

D. None of these

Answer: B

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50. Let $f(x) = \begin{cases} \frac{\sqrt{1+ax}-\sqrt{1-ax}}{x} & -1 \leq x < 0 \\ \frac{2x+1}{x-2} & 0 \leq x \leq 1 \end{cases}$ is continuous in [-1, 1].

Then a equals :

A. -1

B. 1

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

D. $-\frac{1}{2}$

Answer: D

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51. For $x \in R$, $\lim_{x \to \infty} \left(\frac{x-3}{x+2} \right)^x$ is equal to :

A. e

B. e^{-1}

C. e^{-5}

D. e^5

Answer: C

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52. $\lim_{x \to 0} \frac{\sin\left(\pi \cos^2 x\right)}{x^2}$ equals :

A. $-\pi$

B. π

C. $\frac{\pi}{2}$

D. 1

Answer: B

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53. $\lim_{x \to 0} \frac{\sqrt{1 - \cos 2x}}{\sqrt{2}x}$ is :

A. 1

B. -1

C. 0

D. does not exist

Answer: D

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54. For $x \in R$, $\lim_{x \to \infty} \left(\frac{x - 3}{x + 2} \right)^x$ is :

A. e

B. e^{-1}

C. e^{-5}

D. e^{5}

Answer: C

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55. The integer n for which $\lim_{x \to 0} \frac{(\cos x - 1)(\cos x - e^{x})}{x^{n}}$ is a finite non-zero number is :

A. 1

B. 2

C. 3

D. 4

Answer: C

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Multiple Choice Questions Level Ii

1. $\lim_{x \to 0} \frac{\sin x + \log(1 - x)}{x^2}$ is :

A. 0

B. $\frac{1}{2}$

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

D. None of these

Answer: C

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2. $\lim_{x \to \infty} \frac{(2 + x)^{40}(4 + x)^5}{(2 - x)^{45}}$ is :

A. -1

B. 1

C. 16

D. 32

Answer: A

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3. $\lim_{h \to 0} \frac{\left[2\sqrt{3}\sin\left(\frac{\pi}{6}+h\right)-\cos\left(\frac{\pi}{6}+h\right)\right]}{\sqrt{3}h\left(\sqrt{3}\cos h-\sin h\right)}$ is :

A. $2/3$

B. $4/3$

C. $-2\sqrt{3}$

D. $-4/3$

Answer: B

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4. $\lim_{x \to 0} \phi(x) = a^3, a \neq 0$, then $\lim_{x \to 0} \phi\left(\frac{x}{a}\right)$ is :

A. a^2

B. $\frac{1}{a^2}$

C. $\frac{1}{a^3}$

D. a^3

Answer: D

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5. $\lim_{x \to 2^+} \left(\frac{[x]^3}{3} - \left[\frac{x}{3}\right]^3 \right)$ equals :

A. 0

B. $\frac{64}{27}$

C. $\frac{8}{3}$

D. None of these

Answer: C

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6. Let $f(x) = x(-1)^{[1/x]}, x \neq 0$, where [x] denotes the greatest integer $\leq x$, then $\lim_{x \to 0} f(x)$:

A. does not exist

B. is ∞

C. is 0

D. is -1

Answer: C

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7. $\lim_{h \to 0} \frac{\tan(a+2h) - 2\tan(a+h) + \tan a}{h^2}$ is :

A. $2\tan a\sec^2 a$

B. $2\sec^2 a$

C. $2\tan a$

D. does not exist

Answer: A

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8. If $f(x) = \begin{bmatrix} \frac{\sin[x]}{[x]} & [x] \neq 0 \\ 0 & [x] = 0 \end{bmatrix}$, then $\lim_{x \to 0} f(x)$ is :

A. -1

B. 0

C. 1

D. does not exist

Answer: D

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9. $\lim_{n \to \infty} \left(\frac{2}{3} + \left(\frac{2}{3} \right)^2 + \left(\frac{2}{3} \right)^3 + \ldots\ldots + \left(\frac{2}{3} \right)^n \right)$ is :

A. 1

B. 2

C. $1/2$

D. None of these

Answer: B

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10. $\lim_{x \to \infty} \frac{e^{x^2} - \cos x}{x^2}$ is equal to :

A. $\frac{2}{3}$

B. $\frac{1}{2}$

C. $\frac{3}{2}$

D. None of these

Answer: C

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11. $\lim_{x \to 0} \frac{\log(1 + x + x^2) + \log(1 - x - x^2)}{\sec x - \cos x}$ is equal to :

A. 2

B. 1

C. 0

D. does not exist

Answer: B

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12. The value of $\lim_{n \to \infty} \cos\left(\frac{x}{2}\right)\cos\left(\frac{x}{4}\right)\cos\left(\frac{x}{8}\right).....\cos\left(\frac{x}{2^n}\right)$ is

A. 1

B. $\frac{\sin x}{x}$

C. $\frac{x}{\sin x}$

D. None of these

Answer: B

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13. $\lim_{x \to 0} \frac{\log_{\sec x/2} \cos x}{\log_{\sec x} \cos x/2}$ is equal to :

A. 2

B. 4

C. 8

D. 16

Answer: D

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14. The value of $\lim_{x \to 1} \left(\frac{x^3 + 2x^2 + x + 1}{x^2 + 2x + 3} \right)^{\frac{1 - \log(x-1)}{(x-1)^2}}$ is equal to : then f is :

A. e

B. $e^{1/2}$

C. 1

D. $\sqrt{5/6}$

Answer: D

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15. If $f(x) = \frac{2}{x-3}, g(x) = \frac{x-3}{x+4}$ and $h(x) = \frac{-2(2x+1)}{x^2+x-12}$, then $\lim_{x \to 3} [f(x) + g(x) + h(x)]$ is equal to :

A. $\frac{-2}{7}$

B. 0

C. -2

D. -1

Answer: A

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16. $\lim_{x \to \infty} \left(\sqrt{x + \sqrt{x + \sqrt{x}}} - \sqrt{x} \right)$ is equal to :

A. e^4

B. log 2

C. 0

D. $\frac{1}{2}$

Answer: D

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17. The value of $\lim_{x \to \infty} \left\{ \frac{x^2 \sin\left(\frac{1}{x}\right) - x}{1 - |x|} \right\}$ is :

A. -1

B. 0

C. 1

D. None of these

Answer: B

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18. $\lim_{x \to 0} \left[\int_y^a e^{\sin^2 t} dt - \int_{x+y}^a e^{\sin^2 t} dt \right] \div x$ is equal to :

A. $e^{\sin^2 y}$

B. $\sin 2y e^{\sin^2 y}$

C. 0

D. None of these

Answer: A

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19. If

$\sum_{r=1}^{k} \cos^{-1} \beta r = \frac{k\pi}{2}$, for any k ≥ 1 and $A = \sum_{r=1}^{k} (\beta r)^r$, then $\lim_{x \to A}$ $\frac{(1+x^2}{}$

is equal to :

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{7}$

Answer:

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20. The value of $\lim_{x \to 0} \frac{\int_0^{x^2} \cos t^2 dt}{x \sin x}$ is :

A. $\frac{3}{2}$

B. 1

C. -1

D. None of these

Answer: B

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21. $\lim_{x \to \infty} \frac{\int_0^{2x} xe^2 dx}{e^{4x^2}}$ equals :

A. 0

B. ∞

C. 2

D. $\frac{1}{2}$

Answer: D

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22. $\lim_{x \to 2} \frac{\sqrt{x-2} + \sqrt{x} - \sqrt{2}}{\sqrt{x^2-4}}$ is equal to :

A. $\frac{1}{2}$

B. 1

C. 2

D. None of these

Answer: A

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23. $\lim_{x \to 0} \frac{x\sqrt{y^2 - (y-x)^2}}{\left(\sqrt{8xy - 4x^2} + \sqrt{8xy}\right)^3}$ equals :

A. $\frac{1}{2\sqrt{2}}$

B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. None of these

Answer: D

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24. If $S_n = \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \ldots\ldots$ to n terms, then $\lim_{n \to \infty} S_n$ equals :

A. $\frac{1}{3}$

B. $\frac{1}{4}$

C. 3

D. infinite

Answer: A

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25. Let the rth term, t_r, of a series is given by : $t_r = \frac{r}{1 + r^2 + r^4}$. "Then" $\lim_{n \to \infty} \sum_{r=1}^{n} t_r$ equals :

A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 1

D. None of these

Answer: B

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26. Let f(x), g(x) be differentiable functions and f(1) = g(1) = 2, then : $\lim_{x \to 1} \frac{f(1)g(x) - f(x)g(1) - f(1) + g(1)}{g(x) - f(x)}$ equals :

A. 2

B. 0

C. 1

D. None of these

Answer: A

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27. Let {x} denote the fractional part of xlim Then $\lim_{X \to 0} \frac{\{x\}}{\tan\{x\}}$ equals :

A. -1

B. 0

C. 1

D. None of these

Answer: C

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28. $\lim_{n \to \infty} \left[\frac{1}{1-n^4} + \frac{8}{1-n^4} + \ldots\ldots + \frac{n^3}{1-n^4} \right]$ equals :

A. $\frac{1}{8}$

B. $-\frac{1}{4}$

C. $\frac{1}{4}$

D. None of these

Answer: B

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29. $\lim_{x \to \pi/3} \frac{2\sin(x - \pi/3)}{1 - 2\cos x}$ equals :

A. $\frac{2}{\sqrt{3}}$

B. $\frac{1}{\sqrt{2}}$

C. $\frac{1}{3}$

D. $\frac{2}{3}$

Answer: A

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30. Let $f(x) = \begin{cases} x\left(\sin 1/x + \sin\left(1/x^2\right)\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ Then $\lim_{x \to \infty} f(x)$ equals :

A. $-\frac{1}{2}$

B. 0

C. 1

D. None of these

Answer: C

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31. $\lim_{x \to 0} \frac{\tan\left[e^2\right]x^2 - \tan\left[-e^2\right]x^2}{\sin^2 x}$ equals :

A. 0

B. 8

C. 15

D. None of these

Answer: C

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32. If $\lim_{x \to 0} (1 + px)^{q/x} = e^4$, where p, q, $\in$ N, then :

A. p = 4, q = 2

B. p = 8, q = 4

C. p = 16, q = 8

D. None of these

Answer: D

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33. Let $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3 + 3x^2 - 7.$ Then $\lim_{h \to 0} \frac{f(1-h) - f(1)}{h^3 + 3h}$ equals :

A. $\frac{22}{3}$

B. $\frac{29}{3}$

C. $\frac{52}{3}$

D. $\frac{53}{3}$

Answer: D

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34. Let $f(x) = < x >^*$, where $< x >^*$ is the distance from x to the integer nearest to x, then $\lim_{x \to 2} f(x)$ is :

A. 0

B. 1

C. 2

D. 3

Answer: A

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35. $\lim_{x \to 2^+} \left(\frac{[x]^3}{3} - \left[\frac{x}{3} \right]^3 \right)$ equals :

A. 0

B. $\frac{8}{3}$

C. $\frac{64}{27}$

D. None of these

Answer: B

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36. If the function $f(x) = \begin{cases} (\cos x)^{1/x} & x \neq 0 \\ k & x = 0 \end{cases}$ is continuous at x = 0, value of k is :

A. 1

B. -1

C. 0

D. e

Answer: A

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37. Let $f(x) = |x|\cos\frac{1}{x} + 15x^2, x \neq 0,$

$= k, x = 0,$ then f(x) is continuous at x = 0, if k is :

A. 15

B. -15

C. 0

D. 6

Answer: C

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38. If

$$\lim_{x \to a^+} f(x) = l = \lim_{x \to a^-} g(x) \text{ and } \lim_{x \to a^-} f(x) = m = \lim_{x \to a^+} g(x),$$

then the function f(x) g(x) :

A. is continuous at x = a

B. is not continuous at x = a

C. has a limit when $x \to a$ and is equal to lm

D. has a limit when $x \to a$, but it is not equal to lm

Answer: C

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39. The following are continuous on $(0, \pi)$:

A. $1, 0 \leq x \leq \frac{3\pi}{4}$

$2 \sin \frac{x}{3}, \frac{3\pi}{4} < x < \pi$

B. $\int_0^x \sin \frac{1}{t} dt$

C. $\tan x$

D. $x \sin x, 0 < x \leq \frac{\pi}{2},$

$\frac{\pi}{2} \sin(\pi + x), \frac{\pi}{2} < x < \pi$

Answer: B

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40. The value of b for which the function : $f(x) = \begin{cases} 5x - 4 & \text{if } 0 < x \leq 1 \\ 4x^2 + 3bx & \text{if } 1 < x < 2 \end{cases}$ is continuous at every point of its domain is :

A. -1

B. 0

C. 1

D. $\frac{13}{3}$

Answer: A

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41. Let $f(x) = \begin{bmatrix} 5^{1/x} & x < 0 \\ \lambda[x] & x \leq 0, \lambda \in R \end{bmatrix}$, then at x = 0 :

A. f is continuous whatever λ may be

B. f is discontinuous

C. f is continuous only if $\lambda = 0$

D. None of these

Answer: A

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42. Let $f(x) = \begin{cases} \frac{g(x)-g(a)}{x-a} & x \neq 0 \\ g'(a) & x = a \end{cases}$, where g is a function derivable at x = a, then at x = a :

A. f is continuous only if g'(a) = 0

B. f is continuous

C. f is discontinuous

D. None of these

Answer: B

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43. Let $f(x) = \begin{cases} 1 & x \leq -1 \\ |x| & -1 < x < 1 \\ 0 & x \geq 1 \end{cases}$, then :

A. f is continuous at x = -1

B. f is differentiable at x = -1

C. f is continuous everywhere

D. f is differentiable for all x

Answer: A

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44. The function f(x) = [x] is :

A. discontinuous only for integral x

B. a constant function

C. continuous for all x

D. derivable for all x

Answer: A

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45. Let $f(x) = \frac{1 - \cos px}{x \sin x}$, where $x \neq 0$ and $f(0) = \frac{1}{2}$. If f is continuous at 0, then p is equal to :

A. 1 or -1

B. -2

C. 2

D. None of these

Answer: A

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46. Let $f(x) = \frac{1 - \sin x}{(\pi - 2x)^2}$, where $x \neq \pi/2$ and $f(\pi/2) = k$. The value of k which makes f continuous at $\pi/2$ is :

A. $1/8$

B. $1/4$

C. $1/2$

D. None of these

Answer: A

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47. Let $f(x) = \frac{\tan(\pi/4 - x)}{\cot 2x}$ for x $\neq \pi/4$, then for f to be continuous at $x = \pi/4$, $f(\pi/4)$ must be equal to :

A. 1

B. 2

C. $1/2$

D. None of these

Answer: C

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48. Let $f(x) = \begin{cases} \frac{x^2}{a} & 0 \leq x < 1 \\ a & 1 \leq x < \sqrt{2} \\ \frac{2b^2 - 4b}{x^2} & \sqrt{2} \leq x \end{cases}$ be continuous in $[0, \infty)$, then the most suitable values of a and b are :

A. a = -1, b = 1

B. a = -1, b = 1 + $\sqrt{2}$

C. a = 1, b = -1

D. None of these

Answer: A

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49. The value of f(0) so that the function : $f(x) = \frac{\sqrt{1+x} - (1+x)^{1/3}}{x}$ becomes continuous, is equal to :

A. $\frac{1}{3}$

B. 2

C. $\frac{1}{6}$

D. $\frac{1}{4}$

Answer: C

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50. Let $f(x) = \frac{\sqrt{1+\sin x} - \sqrt{1-\sin x}}{x}$lim The value, which should be assigned to f at x = 0 so that it is continuous everywhere, is :

A. 1

B. 2

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

D. -2

Answer: A

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51. To make $f(x) = (x+1)^{\cot x}$ continuous at $x = 0$, $f(0)$ must defined as

A. $f(0) = \frac{1}{e}$

B. f(0) = 0

C. f(0) = e

D. None of these

Answer: C

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52. If $f(x) = \frac{1}{2}x - 1$, then on the interval $[0, \pi]$:

A. tan [f(x)] is continuous but $\frac{1}{f(x)}$ is not

B. tan [f(x)] and $f^{-1}(x)$ are both continuous

C. tan [f(x)] and $\frac{1}{f(x)}$ are both continuous

D. tan [f(x)] and $\frac{1}{f(x)}$ are both discontinuous

Answer: D

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53. The value of x, where the function : $f(x) = \frac{\tan x \log(x-2)}{x^2 - 4x + 3}$ is discontinuous, is given by :

A. $(-\infty, 2)$

B. $(-\infty, 2) \cup \{3\}$

C. $(-\infty, 2) \cup \left\{3, n\pi + \frac{\pi}{2}, n \geq 1\right\}$

D. None of these

Answer: C

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54. Let $f(x) = \frac{\tan\left(\frac{\pi}{4} - x\right)}{\cot 2x}, x \neq \pi/4$, the value which should be assigned to f at $x = \pi/4$, so that it is continuous everywhere is :

A. 2

B. $1/2$

C. 1

D. None of these

Answer: B

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55. Let f(x) = x + 2, where $x \leq 1$ and $f(x) = 4x - 1$, when $x > 1$, then :

A. f(x) is discontinuous at x = 0

B. f(x) is continuous at x = 1

C. $\lim_{x \to 1} f(x) = 4$

D. None of these

Answer: B

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56. Let the function f be defined by $f(x) = \mathrm{x}\sin\frac{1}{x}$, when $x \neq 0 = 0$, when x = 0. Then at x = 0, f is :

A. not defined

B. continuous

C. not continuous

D. None of these

Answer: B

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57. $f(x) = \frac{|x-a|}{x-a}$, when $x \neq a, \ = 1$, when x = a, then :

A. f has a limit 1 at x = a

B. f is continuous everywhere

C. f is continuous at x = a

D. limit of f does not exist at x = a

Answer: D

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58. The value of f(0) for which the function : $\frac{\log_e(1-ax)-\log_3(1-bx)}{x}$ is continuous at x = 0 is :

A. b - a

B. a + b

C. $-(a+b)$

D. a - b

Answer: A

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59. If $f(x) = \frac{(e^x - 1)^4}{\sin\left(\frac{x^2}{\lambda^2}\right)\log\left(1 + \frac{x^2}{2}\right)}, x \neq 0$ and $f(0) = 8$ be a continuous functions, then λ equals :

A. 2

B. 1

C. -1

D. 3

Answer: A

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60. If $f(x) = [x] + [-x], x \neq 2 = \lambda, x = 2$, then f is continuous at x = 2, provided λ is equal to :

A. 2

B. -1

C. 1

D. 0

Answer: B

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61. Let f(x) be defined by $f(x) = \begin{cases} \frac{|x^2 - x|}{x^2 - x} & x \neq 0,1 \\ 1 & x = 0 \\ -1 & x = 1 \end{cases}$ Then f(x) is continuous for all :

A. x

B. x except at x = 0

C. x except at x = 1

D. x except at x = 0 and x = 1

Answer: D

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62. $\lim_{x \to \infty} \left(\frac{x^2 + 5x + 3}{x^2 + x + 2} \right)^x$ is :

A. e^4

B. e^2

C. e^3

D. e

Answer: A

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63. $\lim_{x \to 0} \frac{\log(3 + x) - \log(3 - x)}{x} = k$, the value of k is :

A. $-\frac{1}{3}$

B. $\frac{2}{3}$

C. $-\frac{2}{3}$

D. 0

Answer: B

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64. $\lim_{x \to \frac{\pi}{2}} \frac{(1 - \tan x/2)(1 - \sin x)}{(1 + \tan x/2)(\pi - 2x)^3}$ is :

A. 0

B. $\frac{1}{32}$

C. ∞

D. $\frac{1}{8}$

Answer: B

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65. The value of $\lim_{x \to 0} \frac{\int_0^{x^2} \sec^2 t dt}{x \sin x}$ is :

A. 2

B. 1

C. 0

D. 3

Answer: B

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66. The value of $\lim_{n \to \infty} \frac{1 + 2^4 + 3^4 + \ldots.. + n^4}{n^5} - \lim_{n \to \infty} \frac{1 + 2^3 + 3^3 + \ldots.. + n^3}{n^5}$ is :

A. zero

B. $\frac{1}{4}$

C. $\frac{1}{5}$

D. $\frac{1}{30}$

Answer: C

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67. $\lim_{x \to 0} \frac{\sin nx[(a-n)nx - \tan x]}{x^2} = 0$, where n is non-zero positive integer, tehn a is equal to :

A. $\frac{(n+1)}{n}$

B. n^2

C. $\frac{1}{n}$

D. $n + \frac{1}{n}$

Answer: D

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68. If $\lim_{h \to 0} \left(1 + \frac{a}{x} + \frac{b}{x^2}\right)^{2x} = e^2$, then the values of a and b, are :

A. $a \in R, b \in R$

B. $a = 1, b \in R$

C. $a \in R, b = 2$

D. $a = 1, b = 2$

Answer: B

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69. Let $f(x) = \frac{1 - \tan x}{4x - \pi}, x \neq \frac{\pi}{4}, x \in \left[0, \frac{\pi}{2}\right]$, if f(x) is continuous in $\left[0, \frac{\pi}{4}\right]$, then $f\left(\frac{\pi}{4}\right)$ is :

A. 1

B. $\frac{1}{2}$

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

D. -1

Answer: C

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70. Let α and β be the distinct roots of $ax^2 + bx + c = 0$, then $\lim_{x \to \alpha} \frac{1 - \cos(ax^2 + bx + c)}{(x - \alpha)^2}$ is equal to :

A. 0

B. $\frac{a^2}{2}(\alpha - \beta)^2$

C. $\frac{1}{2}(\alpha - \beta)^2$

D. $-\frac{a^2}{2}(\alpha - \beta)^2$

Answer: B

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71. $\lim_{x \to \frac{\pi}{4}} \frac{\int_2^{\sec^2 x} f(t)dt}{x^2 - \frac{\pi^2}{16}}$ equals :

A. $\frac{8}{\pi} f(2)$

B. $\frac{2}{\pi} f(2)$

C. $\frac{2}{\pi} \frac{f(1)}{2}$

D. 4f (2)

Answer: A

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72. For $x > 0$, $\lim_{x \to 0} \left((\sin x)^{1/x} + \left(\frac{1}{x} \right)^{\sin x} \right)$ is :

A. 0

B. -1

C. 1

D. 2

Answer: C

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73. The function $f: R/\{0\} \to R$ given by :

$f(x) = \frac{1}{x} - \frac{2}{e^{2x} - 1}$ can be made continuous at x = 0 by defining f(0) as :

A. -1

B. 0

C. 1

D. 2

Answer: C

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Latest Questions From Aieee Jee Examinations

1. The values of $\lim_{x \to 0} \frac{1}{x^3} \int_0^x \frac{tIn(1+t)}{t^4 + 4} dt$ is :

A. 0

B. $\frac{1}{12}$

C. $\frac{1}{24}$

D. $\frac{1}{64}$

Answer: B

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2. $\lim_{x \to 2} \left(\frac{\sqrt{1 - \cos\{2(x-2)\}}}{x-2} \right)$:

A. does not exist

B. equals $\sqrt{2}$

C. equals $-\sqrt{2}$

D. equals $\frac{1}{\sqrt{2}}$

Answer: A

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3. If $\lim_{x \to 0} \left[1 + xIn\left(1 + b^2\right)\right]^{\frac{1}{x}} = 2b\sin^2\theta, b > 0$ and $\theta \in (-\pi, \pi]$, then the value of θ is :

A. $\pm\frac{\pi}{4}$

B. $\pm\frac{\pi}{3}$

C. $\pm\frac{\pi}{6}$

D. $\pm\frac{\pi}{2}$

Answer: D

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4. The values of p and q for which the function :

$$f(x) = \begin{cases} \frac{\sin(p+1)x + \sin x}{x} & x < 0 \\ q & x = 0 \\ \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{3/2}} & x > 0 \end{cases}$$ is :

continuous for all x in R, are :

A. $p = \frac{1}{2}, q = -\frac{3}{2}$

B. $p = \frac{5}{2}, q = \frac{1}{2}$

C. $p = -\frac{3}{2}, q = \frac{1}{2}$

D. $p = \frac{1}{2}, q = \frac{3}{2}$

Answer: C

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5. Let $f: R \to [10, \infty)$ be such that $\lim_{x \to 5} f(x)$ exists and $\lim_{x \to 5} \frac{(f(x))^2 - 9}{\sqrt{|x-5|}} = 0$. Then $\lim_{x \to 5} f(x)$ equals :

A. 10

B. 1

C. 2

D. 3

Answer: D

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6. If $f: R \to R$ is a function defined by : $f(x) = [x] c \cos\left(\frac{2x-1}{2}\right)\pi$, where [x] denotes the greatest integer function, then 'f' is :

A. continuous for every real x

B. discontinuous only at x = 0

C. discontinuous only at non-zero integral values of x

D. continuous only at x = 0

Answer: A

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7. If $\lim_{x \to \infty}\left(\frac{x^2+x+1}{x+1} - ax - b\right) = 4$, then :

A. a = 1, b = 4

B. a = 1, b = -4

C. a = 2, b = -3

D. a = 2, b = 3

Answer: B

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8. Let $\alpha(a)\beta(a)$ be the roots of the equations : $\left(\sqrt[3]{1+a}-1\right)x^2+\left(\sqrt{1+a}-1\right)x+\left(\sqrt[6]{1+a}-1\right)=0,$ where $a>-1$. Then $\lim_{a\to 0^+}\alpha(a)$ and $\lim_{a\to 0^+}\beta(a)$ are :

A. $-\frac{5}{2}$ and 1

B. $-\frac{1}{2}$ and -1

C. $-\frac{7}{2}$ and 2

D. $-\frac{9}{2}$ and 3

Answer: B

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9. $\lim_{x \to 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is equal to :

A. $\frac{1}{2}$

B. 1

C. 2

D. $-\frac{1}{4}$

Answer: C

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10. $\lim_{x \to 0} \frac{\sin\left(\pi \cos^2 x\right)}{x^2}$ is equal to :

A. 1

B. $-\pi$

C. π

D. $\frac{\pi}{2}$

Answer: C

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11. $\lim_{x \to 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is equal to :

A. 4

B. 3

C. 2

D. $\frac{1}{2}$

Answer: C

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Questions From Karnataka Cet Comed

1. If $f(x) = \begin{cases} \frac{3\sin \pi x}{5x} & x \neq 0 \\ 2k & x = 0 \end{cases}$ is continuous at x = 0, then the value of k is equal to :

A. $\frac{3\pi}{10}$

B. $\frac{3\pi}{5}$

C. $\frac{\pi}{10}$

D. $\frac{3\pi}{2}$

Answer: A

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2. If the function f(x) satisfies $\lim_{x \to 1} \frac{f(x) - 2}{x^2 - 1} = \pi$, then $\lim_{x \to 1} f(x) =$

A. 2

B. 3

C. 1

D. 0

Answer: A

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3. $\lim_{n \to \infty} \frac{(1^2 + 2^2 \ldots\ldots + n^2)(n)^{1/n}}{(n+1)(n+10)(n+100)} =$

A. 3

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. ∞

Answer: B

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4. $\lim_{x \to 0} \frac{1 - \cos x}{x^2}$ is :

A. 2

B. 3

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

D. $\frac{1}{3}$

Answer: C

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5. The function $f(x) = [x]$ where $[x]$ is the greatest integer function is continous at

A. 4

B. -2

C. 1

D. integers

Answer: D

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6. $f(x) = \begin{cases} 3x - 8 & \text{if} x \leq 5 \\ 2k & \text{if} x > 5 \end{cases}$

A. $\frac{2}{7}$

B. $\frac{3}{7}$

C. $\frac{4}{7}$

D. $\frac{7}{2}$

Answer: D

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7. $\lim_{x \to \infty} \left(\sqrt{a^2 x^2 + bx + c} - ax \right) =$

A. $\frac{b}{2a}$

B. $\frac{b}{a}$

C. 0

D. $\frac{2b}{a}$

Answer: A

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