MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

CONTINUITY

Practice Exercise Exercise 1 Topical Problems

1. The function $f(x) = 3x + 3$ is continuous in

A. $R - \{0\}$

B. R

C. C

D. $R - \{-1\}$

Answer: B

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2. If the function $f(x) = \frac{\sin 6x}{3x}, x \neq 0$ is continuous at x = 0, then f(0) is equal to

A. -2

B. 2

C. 3

D. -3

Answer: B

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3. If $f(x) = \frac{\sqrt{x+3}-2}{x^3-1}$ for $x \neq 1$ is continuous at x = 1. then f(1) is

A. 12

B. 8

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

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

Answer: C

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4. If $f(x) = \frac{\log x - \log 7}{x^2 - 49}$ is continuous at x = 7, then f(7) is

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

B. $\frac{1}{49}$

C. $\frac{1}{98}$

D. $\frac{1}{79}$

Answer: C

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5. If $f(x) = \dfrac{3^x + 3^{-x} - 2}{x^2}$ for $x \neq 0$ is continuous at x = 0, iff f(0) is equal to

A. log 3

B. $(\log 3)^2$

C. $\log\left(\dfrac{1}{3}\right)$

D. e^3

Answer: B

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6. If $f(x) = \begin{cases} \frac{x^6 - \frac{1}{64}}{x^3 - \frac{1}{8}}, & x \neq \frac{1}{2} \\ k, & x = \frac{1}{2} \end{cases}$ is continuous at $x = \dfrac{1}{2}$ then the value of k is

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

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

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

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

Answer: C

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7. If $f(x) = \begin{cases} \frac{\log x - \log 3}{x-3} & \text{for } x \neq 3 \\ c & \text{for } x = 3 \end{cases}$ is continuous at x = 3, then the value of c is

A. 3

B. 2

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

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

Answer: C

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8. $f(x) = x + |x|$ is continuous for

A. $x \in (-\infty, \infty)$

B. $x \in (-\infty, \infty) - \{0\}$

C. only $x > 0$

D. no value of x

Answer: A

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9. Let f(x) be given that $f(x) = \begin{cases} x & \text{if x is rational} \\ 1 - x & \text{if x is irrational} \end{cases}$

The number of points at which f(x) is continuous, is

A. ∞

B. 1

C. 0

D. None of these

Answer: B

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10. Let $f(x) = \begin{cases} 5^{1/x}, & x < 0 \\ \lambda[x], & x \geq 0 \end{cases}$ and $\lambda \in R$, then at x = 0

A. f is dicontinuous

B. f is continuous only, if $\lambda = 0$

C. f is continuous only whatever λ may be

D. None of the above

Answer: C

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11. The value of f(0) so that $f(x) = \frac{(-e^x + 2^x)}{x}$ may be continuous at x = 0 is

A. $\log\left(\frac{1}{2}\right)$

B. 0

C. 4

D. $-1 + \log 2$

Answer: D

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12. *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 find the value of $f\left(\frac{\pi}{4}\right)$.

A. 1

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

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

D. -1

Answer: C

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13. The function $f: R\text{~}\{0\}\overrightarrow{R}$ given by $f(x) = \frac{1}{x} - \frac{2}{e^{2x}-1}$ can be made continuous at x = 0 by defining f(0) as (1) 2 (2) -1 (3) 0 (4) 1

A. 2

B. -1

C. 0

D. 1

Answer: D

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14. Function $f(x) = \begin{cases} x-1, & x < 2 \\ 2x-3, & x \geq 2 \end{cases}$ is a continuous function

A. for x = 2 only

B. for all real values of x such that $x \neq 2$

C. for all real values of x

D. for all integral values of x only

Answer: C

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15. For the function $f(x) = \begin{cases} \frac{x^3-a^3}{x-a}, & x \neq a \\ b, & x = a \end{cases}$, if f(x) is continuous at x = a, then b is equal to

A. a^2

B. $2a^2$

C. $3a^2$

D. $4a^2$

Answer: C

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16. If the function $f: R \to R$ given by

$f(x) = \begin{cases} x + a, & \text{if } x \leq 1 \\ 3 - x^2, & \text{if } x > 1 \end{cases}$ is continuous at x = 1, then a is equal to

A. 4

B. 3

C. 2

D. 1

Answer: D

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17. Let $\frac{(e^x-1)^2}{\sin\left(\frac{x}{a}\right)\log\left(1+\frac{x}{4}\right)}$ for $x \neq 0$ and $f(0)=12$. If f is continuous at x = 0, then the value of a is equal to

A. 1

B. -1

C. 3

D. -2

Answer: C

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18. If $f(x)=\begin{bmatrix} mx+1 & \text{if } x \leq \frac{\pi}{2} \\ \sin x+n & \text{if } x > \frac{\pi}{2} \end{bmatrix}$ is continuous at $x=\frac{\pi}{2}$, then

A. $m=1, n=0$

B. $m=\frac{m\pi}{2}+1$

C. $n=m\frac{\pi}{2}$

D. $m = n = \frac{\pi}{2}$

Answer: C

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19. Let $f(x) = \begin{cases} \frac{\sin \pi x}{5x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ if f(x) is continuous at x = 0, then k is equal to

A. $\frac{\pi}{5}$

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

C. 1

D. 0

Answer: A

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20. If $f(x) = \begin{cases} \frac{1-\cos x}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x = 0, then the value of k is

A. 0

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

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

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

Answer: A

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21. If $f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x} \end{cases}$ for $1 \leq x < 0$ and $2x^2 + 3x - 2f$ or $0 \leq x \leq 1$ is continuous at $x - 0$ then k

A. -4

B. -3

C. -2

D. -1

Answer: C

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22. If $f(x) = \begin{cases} x^k \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$ is continuous at x = 0, then

A. $k \in (-\infty, 0)$

B. $k \in (1, \infty)$

C. $k \in (-1, \infty)$

D. None of these

Answer: D

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23. If $f(x) = \frac{\sqrt{1+\sin x} - \sqrt{1-\sin x}}{x}$, then we value of f at x = 0, so that f is continuous everywhere, is `

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

B. -1

C. 1

D. 2

Answer: C

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24. 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) $\frac{2}{3}$

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

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

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

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

Answer: A

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25. If f(x) is continuous in $[0, 1]$ and $f\left(\frac{1}{2}\right) = 1$. prove that $\lim_{n \to \infty} f\left(\frac{\sqrt{n}}{2\sqrt{n+1}}\right) = 1$

A. 0

B. ∞

C. 2

D. None of these

Answer: C

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26. If $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$, then

A. $f(0+0) = 1$

B. $f(0-0) = 1$

C. f(x) is continuous at x = 0

D. None of the above

Answer: C

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27. The function $f(x) = \frac{(3^x - 1)^2}{\sin x \cdot \ln(1+x)}, x \neq 0,$ is continuous at $x = 0,$ Then the value of $f(0)$ is

A. $\log_e 3$

B. $2\log_e 3$

C. $(\log_e 3)^2$

D. None of these

Answer: C

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28. The set of points of continuity of the function $f(x) = \sqrt{\frac{1}{2} - \cos^2 x}$ is

A. $\left\{x : \frac{\pi}{4} + 2n\pi \leq x \leq \frac{3\pi}{4} + 2n\pi, n \in I\right\}$

B. $\left\{x : \frac{5\pi}{4} + 2n\pi \leq x \leq \frac{7\pi}{4} + 2n\pi, n \in I\right\}$

C. $\left\{x : \frac{\pi}{4} + 2n\pi \leq x \leq \frac{3\pi}{4} + 2n\pi\right\} \cup \left\{x : \frac{5\pi}{4} + 2n\pi \leq x \leq \frac{7\pi}{4} + 2n\right.$

D. None of the above

Answer: C

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29. The function f(x) = [x], where [x] denotes the greatest integer $\leq x$, is

A. continous everywhere

B. continuous at integral points only

C. continuous at non-integral points only

D. None of the above

Answer: C

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30. If the function $f(x) = \begin{cases} \frac{1-\cos x}{x^2}, & \text{for } x \neq 0 \\ k & \text{for } x = 0 \end{cases}$ continuous at x = 0, then the value of k is

A. 1

B. 0

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

D. -1

Answer: C

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31. If the function $f(x) = \frac{(3x + 4\tan x)}{x}$ continuous at x=0? If not, hwo may the funcation be defined to make it continuous at this point ?

A. $f(x) = \begin{cases} \frac{3x+4\tan x}{x}, & x \neq 0 \\ 7, & x = 0 \end{cases}$

B. $f(x) = \begin{cases} \frac{3x+4\tan x}{x}, & x \neq 0 \\ 6, & x = 0 \end{cases}$

C. $f(x) = \begin{cases} \frac{3x+4\tan x}{x}, & x = 0 \\ 7, & x \neq 0 \end{cases}$

D. None of the above

Answer: A

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32. If $f(x) = \begin{cases} \frac{x^2}{2} & 0 \leq x < 1 \\ 2x^2 - 3x + \frac{3}{2} & 1 \leq x \leq 2 \end{cases}$ then,

A. discontinuous at x = 1

B. discontinuous at x = 2

C. continuous at x = 1

D. None of the above

Answer: C

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33. If $f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2}, & x \neq 2 \\ k, & x = 2 \end{cases}$ is continuous at x = 2, then the value of k is

A. 1

B. 3

C. 6

D. 7

Answer: D

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34. If $R \to R$ is defined by

$$f(x) = \begin{cases} \frac{2\sin x - \sin 2x}{2x\cos x}, & \text{if } x \neq 0 \\ a, & \text{if } x = 0 \end{cases}$$

then the value of a so that f is continuous at x = 0 is

A. 2

B. 1

C. -1

D. 0

Answer: D

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35. The function defined by

$$f(x) = \begin{cases} \left(x^2 + e^{\frac{1}{2-x}}\right)^{-1}, & x \neq 2 \\ k \quad , & x = 2 \end{cases}$$ is continuous from right at the point x =2, then k is equal to

A. 0

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

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

D. None of these

Answer: B

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36. A function f is said to be removable discontinuity at x = 0, if $\lim_{x \to 0} f(x)$ exists and

A. $\lim_{x \to 0} f(x) = f(a)$

B. $\lim_{x \to 0} f(x) \neq f(a)$

C. $\lim_{x \to 0} f(x) = 0$

D. None of these

Answer: B

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37. If $f(x) = \begin{cases} \frac{\log(1+x) - \log(1-x)}{x}, & \text{when } x \neq 0 \\ 3, & \text{when } x = 0 \end{cases}$ is

A. continuous at x = 0.

B. discontinuous at x = 0, but on removable

C. discountinuous at at x = 0, but removable

D. None of these

Answer: C

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38. The function $f(x) = \frac{2x^2 + 7}{x^3 + 3x^2 - x - 3}$ is discontinuous for

A. only x = 1

B. x = 1 and x = -1

C. x = 1, x = -1 and x = -3

D. x = 1, x = -1, x = -3 and other values of x

Answer: C

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39. The number of point at which the function $f(x) = |x - 1| + [x - 2] + \cos x,$ where $x \in [0, 4]$ is not continuous, is ([.] denotes greatest intergest function}

A. 1

B. 2

C. 3

D. 0

Answer: D

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40. If $f(x) = \begin{cases} ax^2 + b, & 0 \leq x < 1 \\ x + 3, & 1 < x \leq 2 \\ 4, & x = 1 \end{cases}$, 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)

Answer: D

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41. The number of discontinuities of the greatest integer function $f(x) = [x], x \in \left(-\frac{7}{2}, 100 \right)$ is equal to

A. 104

B. 100

C. 103

D. 101

Answer: C

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42. The set of points of discontinuity of the function $f(x) = \log|x|$ is

A. {0}

B. ϕ

C. {1, -1}

D. None of these

Answer: A

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43. The set points of discontinuity of the function $f(x) = \frac{|\sin x|}{\sin x}$ is

A. {0}

B. $\{n\pi : n \in I\}$

C. ϕ

D. None of these

Answer: B

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44. The set of points of discontinuity of the function $f(x) = |\sin x|$ is

A. $\{n\pi : n \in I\}$

B. $\left\{(2n+1)\frac{\pi}{2} : n \in I\right\}$

C. ϕ

D. None of these

Answer: C

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45. If $f(x) = \frac{1}{1-x}$, then the points of discontinuity of the function $f[f\{f(x)\}]$ are

A. {0}

B. {0, 1}

C. {1, -1}

D. None of these

Answer: B

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46. The function $f(x) = 2[sgn(2x)] + 2$ has

A. removable discontinuity

B. irremovable discontinuity

C. no discontinuity at x = 0

D. None of these

Answer: B

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47. Which of the following functions have finite number of points of discontinuity in R (where, $[\cdot]$ represents greatest integer function) ?

A. $\frac{|x|}{x}$

B. $x \cdot [x]$

C. tan x

D. $\sin[n\pi x]$

Answer: A

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48. The number of points at which the function $f(x) = \frac{1}{x - [x]}([.]$ denotes, the greatest integer function) is not continuous is

A. 1

B. 2

C. 3

D. None of these

Answer: D

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49. If f(0) = 0 and $f(x) = \frac{1}{\left(1 - e^{-1/x}\right)}$ for $x \neq 0$. Then, only one of the following statements on f(x) is true. That is f(x) is

A. continuous at x = 0

B. not continuous at x = 0

C. both continuous and differentiable at x = 0

D. not defined at x = 0

Answer: B

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50. The function $f(x) = |x| + \frac{|x|}{x}$ is

A. continuous at x = 0

B. discontinuous at the origin because |x| is discontinuous there

C. discontinuous at the origin because $\frac{|x|}{x}$ is discontinuous there

D. discontinuous at the origin because both |x| and $\frac{|x|}{x}$ are discontinuous there

Answer: C

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Exercise 2 Miscellaneous Problems

1. If f(x) be continuous function and g(x) be discontinuous, then

A. $f(x) + g(x)$ must be continuous

B. $f(x) + g(x)$ must be discontinuous

C. $f(x) = g(x)$ for all x

D. Can't say

Answer: B

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2. The function $y = 3\sqrt{x} - |x - 1|$ is continuous at

A. $x \leq 0$

B. $x \geq 0$

C. $0 \leq x \leq 1$

D. $x \geq 1$

Answer: B

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3. $\lim_{n \to \infty} \frac{1^2 + 2^2 + 3^2 + \ldots + n^2}{n^3}$ is equal to

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

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

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

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

Answer: C

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4. If $0 < a < b$, then $\lim_{n \to \infty} \frac{a^n + b^n}{a^n - b^n}$

A. equals 0

B. equals -1

C. equals 1

D. doest not exist

Answer: B

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5. $\lim_{x \to 0} \frac{(1+x)^8 - 1}{(1+x)^2 - 1}$ is equal to

A. 8

B. 6

C. 4

D. 2

Answer: C

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

A. 1

B. 2

C. 0

D. 3

Answer: B

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7. $\lim_{x \to 0} (-1)^{[x]}$ where [.] denotes the greatest function is equal to

A. 0

B. 1

C. -1

D. does not exist

Answer: D

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8. If $\lim_{x \to 1} \frac{ax^2 + bx + c}{(x-1)^2} = 2$, then (a, b, c) is

A. (2, -4, 2)

B. (2, 4, 2)

C. (2, 4, -2)

D. (2, -4, -2)

Answer: A

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9. $\lim_{m \to \infty} \left(\cos \frac{x}{m}\right)^m$ is equal to

A. 0

B. e

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

D. 1

Answer: D

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10. The value of $\lim_{x \to 3} \frac{x^5 - 3^5}{x^8 - 3^8}$ is equal to

A. $\frac{5}{8}$

B. $\frac{5}{64}$

C. $\frac{5}{216}$

D. $\frac{1}{27}$

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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12. At $x = 3$, $f(x) = \begin{cases} x^5 - 243, & \text{if } x \neq 3 \\ x^3 - 27, & \text{if } x = 3 \end{cases}$ is

A. continuous

B. discontinuous

C. underfined

D. removable discontinuous

Answer: A

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13. The value of f(0), if f(x) $= \dfrac{x \tan 2x}{\sin 3x \sin 5x}$ is continuous at x = 0 is

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

B. $\dfrac{2}{5}$

C. $\dfrac{2}{15}$

D. $\frac{15}{2}$

Answer: C

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14. $f(x) = \begin{cases} \frac{5^{\cos x} - 1}{\frac{\pi}{2} - x}, & x \neq \frac{\pi}{2} \\ \log 5, & x = \frac{\pi}{2} \end{cases}$ at $x = \frac{\pi}{2}$ is

A. discontinuous

B. imaginary

C. continuous

D. not defined

Answer: C

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15. If $f(x) = \begin{cases} \frac{\sqrt{1+px}-\sqrt{1-px}}{x}, & -1 \leq x < 0 \\ \frac{2x+1}{x-2}, & 0 \leq x \leq 1 \end{cases}$ is continuous in [-1,1] then p is equal to

A. 0

B. -1

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

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

Answer: D

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16. 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

A. 3

B. 2

C. 1

D. 0

Answer: D

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17. In order that the function $f(x) = (x+1)^{\cot x}$ is continuous at x = 0, the value of f(0) must be 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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18. if $f(x)$ is continuous and $f\left(\frac{9}{2}\right) = \frac{2}{9}$ then the value if $\lim_{x \to 0} f\left(\frac{1 - \cos 3x}{x^2}\right)$ is

A. $\frac{2}{9}$

B. $\frac{9}{2}$

C. 18

D. 81

Answer: A

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19. If $f(x) = \begin{cases} ax + 1, & x \leq \frac{\pi}{2} \\ \sin x + b, & x > \frac{\pi}{2} \end{cases}$ is continuous, then

A. $a = 1, b = 0$

B. $a = b\frac{\pi}{2} + 1$

C. $b = \frac{a\pi}{2}$

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

Answer: C

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20. If $f(x) = \begin{cases} (1+2x)^{1/x}, & \text{for } x \neq 0 \\ e^2, & \text{for } x = 0 \end{cases}$, then

A. $\lim_{x \to 0^+} f(x) = e$

B. $\lim_{x \to 0} f(x) = e^2$

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

D. None of the above

Answer: B

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21. If $f(y) = \begin{cases} \frac{(e^{2y}-1)\cdot \sin y}{y^2} & , \text{ for } y \neq 0 \\ 4 & , \text{ for } y = 0 \end{cases}$, then f(y) is

A. discontinuous at y = 0

B. continuous at y = 0

C. not defined

D. None of the above

Answer: A

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22. If $f(x) = \begin{cases} \frac{\tan x}{\sin x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ then f(x) is

A. continuous everywhere

B. continuous no where

C. continuous at x = 0

D. None of the above

Answer: C

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23. For the function $f(x) = \begin{cases} \frac{\sin^2 ax}{x^2}, & \text{where } x \neq 0 \\ 1, & \text{when } x = 0 \end{cases}$ which one is a true statement

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

B. f(x) is discontinuous at x = 0, when $a \neq \pm 1$

C. f(x) is continuous x = a

D. $\lim_{x \to 0} f(x) = f(0)$

Answer: B

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24. If $f(x) = \begin{cases} x + a\sqrt{2}\sin x, & 0 < x < \frac{\pi}{4} \\ 2x\cot x + b, & \frac{\pi}{4} \leq x \leq \frac{\pi}{2} \\ a\cos 2x - b\sin x, & \frac{\pi}{2} < x \leq \pi \end{cases}$ is continuous at $x = \frac{\pi}{4}$

, then a - b is equal to

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

B. 0

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

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

Answer: D

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25. Which of the following functions is continuous at x = 0 ?

A. $f(x) = \begin{cases} \sin\frac{2x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$

B. $f(x) = \begin{cases} (1+x)^{\frac{1}{x}}, & x \neq 0 \\ 1, & x = 0 \end{cases}$

C. $f(x) = \begin{cases} e^{\frac{-1}{x}}, & x \neq 0 \\ 1, & x = 0 \end{cases}$

D. $f(x) = \begin{cases} \frac{3x + 4\tan x}{x}, & \text{if } x \neq 0 \\ 7, & \text{if } x = 0 \end{cases}$

Answer: D

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26. For what value of k, function $f(x) = \begin{cases} \frac{k\cos x}{\pi - 2x}, & \text{if } x \neq \frac{\pi}{2} \\ 3, & \text{if } x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$?

A. 1

B. 3

C. 5

D. 6

Answer: D

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27. For what value of k, $f(x) = \begin{cases} \frac{2^{x+2}-16}{4^x-16}, & x \neq 2 \\ k, & x = 2 \end{cases}$ is continuous at x = 2?

A. 1

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

C. 2

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

Answer: D

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28. For what value of k, the function

$f(x) = \begin{cases} \frac{x}{|x|+2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x = 0 ?

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

B. 1

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

D. No value

Answer: D

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29. The points of discontinuity of the function $\lim_{n \to \infty} \left(\frac{(2 \sin x)^{2n}}{3^n - (2 \cos x)^{2n}} \right)$

A. R

B. $\left\{ n\pi \pm \frac{\pi}{3}, n \in I \right\}$

C. $\left\{ n\pi \pm \frac{\pi}{6}, n \in I \right\}$

D. None of these

Answer: C

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30. The function $f(x) = (\sin 2x)^{\tan^2 2x}$ is not defined at $x = \frac{\pi}{4}$. The value of $f(\pi/4)$, so that f is continuous at $x = \pi/4$, is

A. $\sqrt{e}$

B. $1/\sqrt{e}$

C. 2

D. None of these

Answer: B

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31. If the function f as defined below is continuous at x=0find the values of a,b and c

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

A. $a = \frac{-3}{2}, c = \frac{1}{2}, b = 0$

B. $a = \frac{3}{2}, c = \frac{1}{2}, b \neq 0$

C. $a = -\frac{3}{2}, c = \frac{1}{2}, b \neq 0$

D. None of the above

Answer: C

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32. If a function y=f(x) is defined as $y = \frac{1}{t^2 - t - 6}$ and $t = \frac{1}{x - 2}, t \in R$. Then f(x) is discontinuous at

A. $2, \frac{2}{3}, \frac{7}{3}$

B. $2, \frac{3}{2}, \frac{7}{3}$

C. $2, \frac{3}{2}, \frac{3}{7}$

D. None of these

Answer: B

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33. Let $f(x) = \begin{cases} \frac{\cos^2 x - \sin^2 x - 1}{\sqrt{x^2+4}-2}, & x \neq 0 \\ a, & x = 0 \end{cases}$, then the value of a in order that f(x) may be continuous at x = 0 is

A. -8

B. 8

C. -4

D. 4

Answer: A

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

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

A. 2

B. 4

C. 6

D. 8

Answer: D

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35. $\lim_{x \to \frac{\pi}{2}} \frac{\left(1 - \tan\left(\frac{x}{2}\right)\right)(1 - \sin x)}{\left(1 + \tan\left(\frac{x}{2}\right)\right)\left((\pi - 2x)^3\right)}$

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

B. 0

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

D. ∞

Answer: C

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36. If $f(x) = \frac{\sin 2x + A \sin x + B \cos x}{x^3}$ is continuous at x = 0, then the values of A, B and f(0) are

A. $A = -2, B = 0$ and $f(0) = -1$

B. $A = 0, B = -2$ and $f(0) = 1$

C. $A = 1, B = -1$ and $f(0) = 0$

D. None of the above

Answer: A

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37. $f(x) = \begin{cases} |x| + 3, & \text{if } x \leq -3 \\ -2x, & \text{if } -3 < x < 3 \\ 6x + 2, & \text{if } x \geq 3 \end{cases}$ is

A. continuous at x = -3 and discontinuous at x = 3

B. continuous at x = -3, 3

C. discontinuous at x = -3, 3

D. continuous at x = 3 and discontinuous at x = -3

Answer: A

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38. The function f given by $f(x) = \begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1}, & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}$, is

A. discontinuous at x = 0

B. continuous at x = 0

C. continuous everywhere

D. None of the above

Answer: A

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39. Which of the following is not continuous for all x ?

A. $|x-1|+|x-2|$

B. $x^2-|x-x^3|$

C. $\sin|x|+|\sin x|$

D. $\frac{\cos x}{|\cos x|}$

Answer: D

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40. Let $f(x)=x^3+x$ be function and $g(x)=\begin{cases} f(|x|), & x\geq 0 \\ f(-|x|), & x<0 \end{cases}$, then

A. g(x) is continuous $\forall x\in R$

B. g(x) is continuous, $\forall x\in R^-$ only

C. g(x) is continuous, $\forall x\in R^+$ only

D. g(x) is discontinuous, $\forall x\in R^-$

Answer: A

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41. The value of f(0), so that the function $f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous everywhere is

A. $1/8$

B. $1/2$

C. $1/4$

D. None of these

Answer: A

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42. The jump value of the function at the point of the discontinuity of the function $f(x) = \frac{1 - k^{\frac{1}{x}}}{1 + k^{\frac{1}{x}}}$(k>0) (k=1) is: (A) 4 (B) 2 (C) 3 (D) None of these

A. 4

B. 2

C. 3

D. None of these

Answer: B

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43. $f(x) = \frac{(4^x - 1)^3}{\sin\left(\frac{x}{p}\right)\log\left(1 + \frac{x^2}{3}\right)}$ is continuous at x=0 and $f(0) = 12(\ln 4)^3$ then p=

A. 1

B. 2

C. 3

D. 4

Answer: D

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44. If the function

$$f(x) = \begin{cases} x + a^2\sqrt{2}\sin x, & 0 \le x < \frac{\pi}{4} \\ x\cot x + b, & \frac{\pi}{4} \le x < \frac{\pi}{2} \\ b\sin 2x - a\cos 2x, & \frac{\pi}{2} \le x \le \pi \end{cases}$$

is continuous in the interval $[0, \pi]$ then the values of (a, b) are

A. $(0, 0)$

B. $\left(0, \frac{1}{2}\right)$

C. $(0, 1)$

D. $(-1, 1)$

Answer: A

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45. If $f(x) = \begin{cases} \frac{\sin 5x}{x^2 + 2x}, & x \neq 0 \\ k + \frac{1}{2}, & x = 0 \end{cases}$ is continuous at x = 0, then the value of k is

A. 1

B. -2

C. 2

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

Answer: C

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46. If $f(x) = 2x$ and $g(x) = \frac{x^2}{2} + 1$, then which of the following can be a discontinuous functions?

A. $f(x) + g(x)$

B. $f(x) - g(x)$

C. $f(x) \cdot g(x)$

D. $\frac{g(x)}{f(x)}$

Answer: D

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47. The function $f(x) = \frac{4 - x^2}{4x - x^3}$ is

A. discontinuous at only one point

B. discontinuous at extactly two points

C. discontinuous at exactly three points

D. None of the above

Answer: C

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48. If $f(x) = \begin{cases} x, & \text{if x is rational} \\ -x, & \text{if x is irrational} \end{cases}$, then

A. f(x) is an odd function

B. f(x) is continuous at $x = \frac{1}{2}$

C. f(x) is continuous at x = 0

D. f(x) is periodic function

Answer: C

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49. If $f(x) = \begin{cases} (\cos x + 3\sin x)^{5\text{cosec}x}, & x \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right) - \{0\} \\ \lambda, & x = 0 \end{cases}$

is continuous at x = 0, then λ will be

A. e^{15}

B. e^2

C. 15

D. 1

Answer: A

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50. Let $f(x)=\begin{cases}\sqrt{1+x^2}, & x<\sqrt{3}\\ \sqrt{3}x-1, & \sqrt{3}\le x<4\\ [x], & 4\le x<5\\ |1-x|, & x\ge 5\end{cases}$, where [x] is the greatest integer $\le x$. The number of points of discontinuity of f(x) in R is

A. 3

B. 0

C. infinite

D. 1

Answer: D

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51. 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) $-a^{\frac{3}{2}}$

A. $a^{3/2}$

B. $a^{1/2}$

C. $-a^{1/2}$

D. $-a^{3/2}$

Answer: C

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52. The function $f(x) = x - |x - x^2|$ is

A. continuous at x = 1

B. discontinuous at x = 1

C. not defined at x = 1

D. None of these

Answer: A

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53. For the function $f(x) = \frac{\log_e(1+x) + \log_e(1-x)}{x}$ to be continuous at x = 0, the value of f(0) is

A. -1

B. 0

C. -2

D. 2

Answer: B

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54. The function $f(x) = \frac{1 - \sin x + \cos x}{1 + \sin x + \cos x}$ is not defined at $x = \pi$. The value of $f(\pi)$, so that f(x) is continuous at $x = \pi$, is

A. $-1/2$

B. $1/2$

C. -1

D. 1

Answer: C

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55. If $f: R \to R$ given by

$$f(x) = \begin{cases} 2\cos x, & \text{if } x \leq -\frac{\pi}{2} \\ a\sin x + b, & \text{if } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 1 + \cos^2 x, & \text{if } x \geq \frac{\pi}{2} \end{cases}$$ is a continuous function on R,

then (a, b) is equal to

A. $(1/2, 1/2)$

B. $(0, -1)$

C. $(0, 2)$

D. $(1, 0)$

Answer: A

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56. If the function $f(x) = \begin{cases} \frac{x^2-(k+2)x+2k}{x-2} & \text{for } x \neq 2 \\ 2 & f \text{ or } x = 2 \end{cases}$ is continuous at x =2, then k is equal to

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

B. -1

C. 0

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

Answer: C

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57. If the function $f(x) = \begin{cases} x, & \text{if } x \leq 1 \\ cx+k, & \text{if } 1 < x < 4 \\ -2x, & \text{if } x \geq 4 \end{cases}$ is continuous everywhere, then the values of c and k are repectively

A. $-3, -5$

B. $-3, 5$

C. $-3, \ -4$

D. $-3, 4$

Answer: D

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58. 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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59. If $f(x) = \begin{cases} ax + 3, & x \leq 2 \\ a^2x - 1, & x > 2 \end{cases}$, then the values of a for which f is continuous for all x are

A. a and -2

B. 1 and 2

C. -1 and 2

D. -1 and -2

Answer: C

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60. $f(x) = \dfrac{7|x| + 5x}{7|x| - 5x}$ for $x \neq 0$, $f(0) = 6atx = 0$is

A. removable discontinuity

B. discontinuity of first kind

C. discontinuity of second kind

D. None of the above

Answer: B

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Mht Cet Corner

1. If the function f(x) defined by

$$f(x) = \begin{cases} x\sin\frac{1}{x}, & \text{for } x \neq 0 \\ k, & \text{for } x = 0 \end{cases}$$

is continuous at x = 0, then k is equal to

A. 0

B. 1

C. -1

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

Answer: A

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2. For what value of k, the function defined by

$$f(x) = \begin{cases} \frac{\log(1+2x)\sin x^{\circ}}{x^2}, & \text{for } x \neq 0 \\ k, & \text{for } x = 0 \end{cases}$$

is continuous at x = 0 ?

A. 2

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

C. $\frac{\pi}{90}$

D. $\frac{90}{\pi}$

Answer: C

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3. If $f(x) = \begin{cases} \frac{\log(1+2ax) - \log(1-bx)}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x = 0, then value of k is

A. b + a

B. b - 2a

C. 2a - b

D. 2a + b

Answer: D

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4. $\lim_{x \to 0} \left(\frac{3^x - 1}{x} \right)$ is equal to

A. 2 log 3

B. 3 log 3

C. log 3

D. None of the above

Answer: C

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5. Let $f(x) = \begin{cases} \{1+|\sin x|\}^{a/|\sin x|}, & \frac{\pi}{6} < x < 0 \\ \text{b}, & x = 0 \\ e^{\tan 2x / \tan 3x}, & 0 < x < \frac{\pi}{6} \end{cases}$

Determine a and b such that f(x) is continous at x = 0.

A. $3/2, e^{3/2}$

B. $-2/3, e^{-3/2}$

C. $2/3, e^{2/3}$

D. None of these

Answer: C

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6. Evaluate:

$(\lim)_{x \to \infty} \left(1 + \frac{1}{a+bx}\right)^{c+dx}, where a, b, c, and d are positive$

A. $e^{d/b}$

B. $e^{c/a}$

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

D. e

Answer: A

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7. The value of a and b such that the function

$$f(x) = \begin{cases} -2\sin x, & -\pi \leq x \leq -\frac{\pi}{2} \\ a\sin x + b, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ \cos x, & \frac{\pi}{2} \leq x \leq \pi \end{cases}$$ is continuous in $[-\pi, \pi]$ are

A. $-1, 0$

B. 1, 0

C. 1, 1

D. $-1, 1$

Answer: D

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8. Given $f(x) = \frac{ax + b}{x + 1}$, $\lim_{x \to \infty} f(x) = 1$ and $\lim_{x \to 0} f(x) = 2$, then f(-2) is

A. 0

B. 1

C. 2

D. 3

Answer: A

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9. $\lim_{x \to 1} (\log ex)^{1/\log x}$ is equal to

A. e^{-1}

B. e

C. e^2

D. 0

Answer: B

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10. If $\lim_{x \to 1} \frac{\left(e^k - 1\right)\sin kx}{x^2} = 4$, then k is equal to

A. 2

B. -2

C. ± 2

D. ± 4

Answer: C

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11. the value of $\lim_{x \to 0} \frac{\cos(\sin x) - \cos x}{x^4}$ is equal to:

A. $1/5$

B. $1/6$

C. $1/4$

D. $1/2$

Answer: B

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12. $\lim_{x \to \infty} \left(\frac{x^2 - 2x + 1}{x^2 - 4x + 2} \right)^x$ is equal to

A. e^2

B. e^{-2}

C. e^6

D. None of these

Answer: A

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13. The value of f at x =0 so that funcation $f(x) = \frac{2^x - 2^{-x}}{x}, x \neq 0$ is continuous at x =0 is

A. 0

B. log 2

C. 4

D. log 4

Answer: D

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14. $\lim_{x \to 0} \left\{ \frac{1 + \tan x}{1 + \sin x} \right\}^{\text{cosec x}}$ is equal to

A. $1/e$

B. 1

C. e

D. e^2

Answer: B

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15. $\lim_{x \to 0} \left[(1+3x)^{1/x}\right] = k$, then k is

A. 3

B. -3

C. e^3

D. e^{-3}

Answer: C

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16. If $f(x) = \begin{cases} \log_{(1-3x)}(1+3x), & \text{for} \quad x \neq 0 \\ k, & \text{for} \quad x = 0 \end{cases}$ is continuous at x = 0, then k is equal to

A. -2

B. 2

C. 1

D. -1

Answer: D

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