MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

LIMITS

Illustration

1. Evaluate the left-and right-hand limits of the function $f(x) = \left\{ \frac{|x-4|}{x-4}, x \neq 4, 0, x = 4, atx = 4 \right.$

A. 1

B. -1

C. 0

D. non-existent

Answer: B

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2. Evaluate the left-and right-hand limits of the function $f(x) = \begin{cases} \frac{|x-4|}{x-4}, x \neq 4, 0, x = 4, atx = 4 \end{cases}$

A. 1

B. -1

C. 0

D. non-existent

Answer: A

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3. Let $f(x) = [x] =$ Greatest integer less than or equal to x and k be an integer. Then, which one of the following in not correct?

A. $\lim_{x \to k^-} f(x) = k - 1$

B. $\lim_{x \to k} f(x) = k$

C. $\lim_{x \to k} f(x) \text{exists}$

D. $\lim_{x \to k} f(x)$ does not exist

Answer: C

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4. Show that $(\lim)_{x \to 0} \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1} does \neg e\xi st$

A. -1

B. 1

C. 0

D. non-existent

Answer: D

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5. If f is an odd function and if $\underset{x \to 0}{\text{Lim}} f(x)$ exists , prove that this limit must be zero .

A. 0

B. -1

C. 1

D. non-existent

Answer: A

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6. $\lim_{x \to k} (x - [x])$, where k is an integer, is equal to (where denotes greatest integer function

A. -1

B. 1

C. 0

D. 2

Answer: B

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7. $\lim_{x \to 2^+} \left(\frac{[x]^3}{3} - \left[\frac{x}{3} \right]^3 \right)$ is where [x] represents the integral part of x

A. 0

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

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

D. non of these

Answer: C

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8. Let $f(x) = \frac{1 - x(1 + |1 - x|)}{|1 - x|} \cos\left(\frac{1}{1 - x}\right)$ for $x \neq 1$. then

A. $\lim_{x \to 1^-} f(x) = 0$

B. $\lim_{x \to 1^-} f(x)$ does not exist

C. $\lim_{x \to 1^+} f(x) = 0$

D. $\lim_{x \to 1^+}$ does not exist.

Answer: A::D

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9. If $n \in N$, and $[x]$ denotes the greatest integer less than or equal to x, then $\lim_{x \to n} (-1)^{[x]}$ is equal to.

A. 1

B. -1

C. 0

D. none of these

Answer: D

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10. $\lim_{x \to 2} \frac{5}{\sqrt{2} - \sqrt{x}}$

A. $10\sqrt{2}$

B. ∞

C. $-\infty$

D. non -existant

Answer: D

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11. $\lim_{x \to 3} ([x-3]+[3-x]-x)$, wehre $[.]$ denotes the greatest integer function, is equal to

A. 4

B. -4

C. 0

D. none of these

Answer: B

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12. The value of $\lim_{x \to \sqrt{3}} \left[x^2\right]$, is

A. 3

B. 2

C. non-existant

D. none of these

Answer: C

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13. If $f: R \overrightarrow{R}$ is defined by $f(x) = [x-3] + |x-4|$ for $x \in R$, then $(\lim)_{x \overrightarrow{3}} f(x)$ is equal to (where [.] represents the greatest integer function) a. b. c. d. -1

A. -2

B. -1

C. 0

D. 1

Answer: C

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14. If $f(x) = \begin{cases} \dfrac{[x]^2 + \sin[x]}{[x]} & \text{for } [x] \neq 0 \\ 0 & \text{for } [x] = 0 \end{cases}$ where $[x]$ denotes the greatest integer function, then , $\lim_{x \to 0} f(x)$, is

A. 1

B. 0

C. -1

D. non-existent

Answer: D

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15. If $f(x) = x \dfrac{e^{[x] + |x| - 2}}{[x] + |x|}$, then $\lim_{x \to 0} f(x)$ is.

A. -1

B. 0

C. 1

D. non-existent

Answer: D

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16. The value of $\lim_{x \to -2} \frac{\left(x^2 - x - 6\right)^2}{(x+2)^2}$, is

A. 6

B. 25

C. 9

D. 16

Answer: B

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17. Evaluate the following limits :

$$\lim_{x \to 1} \frac{\sqrt{(x^2-1)} + \sqrt{(x-1)}}{\sqrt{(x^2-1)}}$$

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

B. $\sqrt{2}+1$

C. 1

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

Answer: D

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18. about to only mathematics

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

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

C. $\frac{\sqrt{3}}{5}$

D. $\frac{3}{5}$

Answer: B

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19. Evaluate the following limits :

$$\lim_{x \to 1} \frac{1 - x^{-1/3}}{1 - x^{-2/3}}$$

A. 2

B. 1

C. $2/3$

D. none of these

Answer: A

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20. $\lim_{x \to 1} \frac{x^8 - 2x + 1}{x^4 - 2x + 1}$ equals

A. 3

B. 0

C. -3

D. 1

Answer: A

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21. $\lim_{x \to \pi/6} \frac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1} =$

A. 3

B. -3

C. 6

D. 0

Answer: B

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22. Let p (x) be a real polynomial of degree 4 having extreme values $x = 1$ and $x = 2$. if $\lim_{x \to 0} \frac{p(x)}{x^2} = 1$, then $p(4)$ is equal to

A. 0

B. 16

C. 32

D. 64

Answer: B

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23. $Lt_{x \to 0} \frac{\sqrt{1+x} - 1}{x}$ is equal to

(i) 0

(ii) 1

(iii) $\frac{1}{2}$

(iv) 2

A. $1/2$

B. 2

C. 0

D. 1

Answer: A

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24. The value of $f(0)$, so that $f(x) = \frac{\sqrt{a^2 - ax + x^2} - \sqrt{a^2 + ax + x^2}}{\sqrt{a + x} - \sqrt{a - x}}$ becomes continuous for all, x is given by

A. a

B. $\sqrt{a}$

C. $-a$

D. $-\sqrt{a}$

Answer: B

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25. The value of $\lim_{x \to 2} \frac{\sqrt{1+\sqrt{2+x}}-\sqrt{3}}{x-2}$ is

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

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

C. $8\left(\sqrt{3}\right)$

D. $\sqrt{3}$

Answer: A

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26. The value of $\lim_{x \to 0} \frac{\sqrt{x+1}-1}{\sqrt{x^2+9}-3}$, is

A. 3

B. 4

C. 1

D. 2

Answer: A

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27. The value of $\lim_{x \to b} \frac{\sqrt{x-a}-\sqrt{b-a}}{x^2-b^2}$, for $b > a$, is

A. $\frac{1}{4b\sqrt{a-b}}$

B. $\frac{1}{4b\left(\sqrt{b-a}\right)}$

C. $\frac{1}{4a\sqrt{a-b}}$

D. $\frac{1}{b\sqrt{b-a}}$

Answer: B

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28. The value of $\lim_{x \to 2a} \frac{\sqrt{x-2a}+\sqrt{x}-\sqrt{2a}}{\sqrt{x^2-4a^2}}$ is

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

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

C. $\frac{\sqrt{a}}{2}$

D. $2\sqrt{a}$

Answer: B

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29. $\lim_{x \to a} \frac{x^m - a^m}{x^n - a^n} = \left(\frac{m}{n}\right) a^{m-n}$ if $m > n$

A. $\frac{m}{n} a^{m-n}$

B. $\frac{n}{m}a^{m-n}$

C. $\frac{m}{n}a^{m+n}$

D. $\frac{m}{n}$

Answer: A

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30. Prove that $\lim_{x \to 0} \frac{(1+x)^n - 1}{x} = n.$

A. 100

B. -100

C. 99

D. -99

Answer: B

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31. If $\lim_{x \to 1} \left(\frac{x + x^2 + x^3 + ... + x^n - n}{x - 1} \right) = 820$, then find n.

A. n

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

C. $\frac{n(n+1)}{2}$

D. $\frac{n(n-1)}{2}$

Answer: C

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32. Evaluate, $\lim_{x \to 1} \frac{x^4 - 1}{x - 1} = \lim_{x \to k} \frac{x^3 - k^3}{x^2 - k^2}$, then find the value of k.

A. $\frac{4}{3}$

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

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

D. none of these

Answer: B

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33. If $\left(\lim\right)_{x \to -a} \frac{x^9 + a^9}{x + a} 9$, find the real value of a.

A. ± 1

B. ± 3

C. ± 2

D. none of these

Answer: A

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34. $\lim x \to \frac{\pi}{4} \frac{4\sqrt{2} - (\cos x + \sin x)^5}{1 - \sin 2x}$ is equal to

A. $5\sqrt{2}$

B. $3\sqrt{2}$

C. $\sqrt{2}$

D. none of these

Answer: A

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35. If $\lim_{x \to 1} \frac{x + x^2 + x^3 + ... + x^n - n}{x - 1} = 5050$, then $n =$

A. 10

B. 100

C. 150

D. none of these

Answer: B

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36. Evaluate : $\lim_{x \to \infty} \frac{ax^2 + bx + c}{dx^2 + ex + f}$.

A. $\frac{a}{d}$

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

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

D. $\frac{c}{f}$

Answer: A

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37. Evaluate: $(\lim)_{x \overrightarrow{\infty}} \frac{\sqrt{3x^2 - 1} - \sqrt{2x^2 - 1}}{4x + 3}$

A. $\frac{\sqrt{3} - \sqrt{2}}{4}$

B. $\frac{1}{4\left(\sqrt{3} - \sqrt{2}\right)}$

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

D. none of these

Answer: B

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38. $\lim_{x \to \infty} \left(\sqrt{x^2 + x + 1} - \sqrt{x^2 + 1}\right) =$

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

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

C. 1

D. -1

Answer: B

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39. $\lim_{x \to -\infty} \left[\sqrt{x^2 + x + 1} + x\right] =$

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

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

C. 1

D. -1

Answer: B

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40. If $\lim_{x \to \infty} \left(\frac{x^2+1}{x+1} - ax - b \right) = 0$, find the values of a and b.

A. $a = 1, b = 1$

B. $a = -1, b = 1$

C. $a = 1, b = -1$

D. $a = -1, b = -1$

Answer: C

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41. If $\lim_{x \to \infty} \left(\frac{x^2+1}{x+1} - ax - b \right) = 2$ find the values of a and b.

A. $= 1, b = 3$

B. $a = -1, b = 3$

C. $a = -1, b = -3$

D. $a = 1, b = -3$

Answer: D

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

A. $a \in (1, \infty)$

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

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

D. none of these

Answer: C

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43. 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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44. $\lim_{n \to \infty} \frac{1 + 2 + 3 + \ldots + n}{1 + 3 + 5 + \ldots . (2n - 1)} =$

A. 1

B. $3/2$

C. $1/2$

D. 2

Answer: C

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45. $\left(\lim\right)_{n\to\infty}\frac{1^2+2^2+3^2++n^2}{n^3}$ is equal to a. 1 b . c. 1/3 d. 0

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

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

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

D. none of these

Answer: B

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46. Value of $\lim_{n \to \infty} \frac{1^3 + 2^3 + 3^3 \ldots + n^3}{n^4}$

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

B. 1

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

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

Answer: C

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47. $\lim_{n \to \infty} \frac{1 + 2^4 + 3^4 + \ldots . + n^4}{n^5} - \lim_{n \to \infty} \frac{1 + 2^2 + 3^3 + \ldots . + n^3}{n^5}$

is:

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

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

C. 0

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

Answer: A

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48. If $S_1 = \Sigma n, S_2 = \Sigma n^2, S_3 = \Sigma n^3$, then the value of $\lim_{n \to \infty} \frac{S_1\left(1 + \frac{S_3}{8}\right)}{S_2^2}$ is equal to

A. $\frac{3}{32}$

B. $\frac{3}{64}$

C. $\frac{9}{32}$

D. $\frac{9}{64}$

Answer: D

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49. $\lim_{n \to \infty} \frac{1.2 + 2.3 + 3.4 + ... + n(n+1)}{n^3}$

A. 1

B. -1

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

D. none of these

Answer: C

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50. If $[x]$ denotes the greatest integer less than or equal to x, then evaluate $\lim_{n \to \infty} \frac{1}{n^2}([1.\, x] + [2.\, x] + [3.\, x] + ... + [n.\, x])$.

A. $x/2$

B. $x/3$

C. x

D. 0

Answer: A

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51. If $[x]$ denotes the greatest integer less than or equal to x, then evaluate $(\lim)_{n\to\infty}\frac{1}{n^3}\left\{[1^2x]+[2^2x]+[3^2x]+\right\}[n^2x]\Big\}$

A. $x/2$

B. $x/3$

C. $x/6$

D. 0

Answer: B

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52. 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

A. 1

B. -1

C. 0

D. none of these

Answer: D

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53. Show that the $\lim_{x \to 2} \left(\frac{\sqrt{1 - \cos\{2(x-2)\}}}{x-2} \right)$ doesnot exist.

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. 2

D. none of these

Answer: D

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54. If f(x) = $\left\{ \frac{\sin[x]}{[x]}, [x] \neq 0; 0, [x] = 0 \right\}$, Where[.] denotes the greatest integer function, then $\lim_{x \to 0} f(x)$ is equal to

A. 1

B. 0

C. -1

D. none of these

Answer: D

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55. The value of $\lim_{x \to 0} \left[\frac{x}{\sin x}\right]$, where $[.]$ represents the greatest integer function,is

A. 1

B. 0

C. -1

D. none of these

Answer: A

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56. The value of $\lim_{x \to 0} \left[\frac{\sin x}{x}\right]$ is (where $[.]$ denotes greatest integer function)

A. 1

B. 0

C. -1

D. none of these

Answer: B

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57. if $[x]$ denotes the greatest integer less than or equal to x, than $\lim_{x \to 0} \frac{x[x]}{\sin|x|}$, is

A. 0

B. 1

C. non-existant

D. none of these

Answer: C

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58. If $[.]$ denotes the greatest integer function , then $\lim_{x \to \pi/2} \left[\frac{x - \frac{\pi}{2}}{\cos x} \right]$ is equal to.

A. 1

B. -1

C. 2

D. -2

Answer: D

Watch Video Solution

59. Evaluate $\lim_{x \to 0} \frac{\tan x - \sin x}{x^3}$.

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

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

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

D. none of these

Answer: A

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60. $\lim_{x \to \frac{\pi}{2}} \frac{\cot x - \cos x}{(\pi - 2x)^3}$ equals

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

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

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

D. $\frac{1}{16}$

Answer: D

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61. $\lim_{x \to \frac{\pi}{6}} \frac{3 \sin x - \sqrt{3} \cos x}{6x - \pi}$

A. $\sqrt{3}$

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

C. $-\sqrt{3}$

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

Answer: B

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62. $\lim_{x \to 0} \frac{\cos(\sin x) - 1}{x^2} =$

A. 1

B. -1

C. $1/2$

D. $-1/2$

Answer: D

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63. If $f(x) = \begin{cases} \frac{\sin(1+[x])}{[x]} \text{for} [x] \neq 0 \\ 0 \quad \text{for} \quad [x] - 0 \end{cases}$ where $[x]$ denotes the greatest integer not exceeding x, then $\lim_{x \to 0^-} f(x) =$

A. -1

B. 0

C. 1

D. 2

Answer: B

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64. $\lim_{x \to 0} \frac{(1 - \cos 2x)\sin 5x}{x^2 \sin 3x}$

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

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

C. $\frac{6}{5}$

D. $\frac{5}{6}$

Answer: A

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

A. 2

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

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

D. -2

Answer: D

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66. $\left(\lim\right)_{x \to 0}\left((1-\cos 2x)\frac{3+\cos x}{x \tan 4x}\right.$ is equal to (1) $\frac{1}{2}$ (2) 1 (3) 2 (4) $-\frac{1}{4}$

A. $-(1)/(4)$

B. $(1)/(2)$

C. 1

D. 2

Answer: D

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

A. $-\pi$

B. π

C. $\pi/2$

D. 1

Answer: B

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

A. 2

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

C. 4

D. 3

Answer: A

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69. $\lim_{x \to 0} \frac{(1 - \tan x/2)(1 - \sin x)}{(1 + \tan x/2)(\pi - 2x)^3}$

A. ∞

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

C. 0

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

Answer: D

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70. Let $\alpha, \beta \varepsilon R$ such that $\lim_{x \to 0} \frac{x^2 \sin(\beta x)}{\alpha x - \sin x} = 1$ Then $6(\alpha + \beta)$

A. 6

B. 7

C. 2

D. 12

Answer: B

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71. If $\lim_{x \to 0} \frac{2ax + (a-1)\sin x}{\tan^3 x} = l$, then $a + l$ is equal to

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

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

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

D. $\frac{4}{9}$

Answer: D

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72. $\lim_{x \to 0} \frac{4^x - 1}{3^x - 1}$ equals

A. $\log_3 4$

B. $\log_4 3$

C. $\log_e 4$

D. $\log_3 4$

Answer: A::D

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73. The value of $\lim_{x \to 0} \frac{e^{ax} - e^{bx}}{x}$,is

A. $a + b$

B. $a - b$

C. $e^a b$

D. 1

Answer: B

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74. $\lim_{x \to 0} \frac{a^x - b^x}{e^x - 1}$ is equal to

A. $\log_e\left(\frac{a}{b}\right)$

B. $\log_e\left(\frac{b}{a}\right)$

C. $\log_e ab$

D. $\log_e(a+b)$

Answer: A

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75. $\lim_{x\to 0}\frac{(1-e^x)\sin x}{x^2+x^3}$ is equal to

A. -1

B. 0

C. 1

D. 2

Answer: A

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76. The value of $\lim_{x \to 0} \frac{e^x - e^{\sin x}}{2(x - \sin x)}$, is

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

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

C. 1

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

Answer: B

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77. The value of $\lim_{x \to 2} \frac{e^{3x-6} - 1}{\sin(2 - x)}$, is

A. $3/2$

B. 3

C. -3

D. -1

Answer: C

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78. The value of $\lim_{x \to 0} \frac{(4^x - 1)^3}{\sin. \frac{x^2}{4} \log(1 + 3x)}$, is

A. $\frac{4}{3}(In4)^2$

B. $\frac{4}{3}(In4)^3$

C. $\frac{3}{2}(In4)^2$

D. $\frac{3}{2}(In4)^3$

Answer: B

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79. The value of $\lim_{x \to e} \frac{\log x - 1}{x - e}$, is

A. 1

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

C. e

D. 0

Answer: B

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80. The value of $\lim_{x \to 1} \frac{\log x}{\sin \pi x}$, is

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

B. $-\pi$

C. π

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

Answer: D

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81. $\lim_{x \to \pi/2} \frac{a^{\cot x} - a^{\cos x}}{\cot x - \cos x} a > 0$ is equal to

A. $\log_2\left(\frac{\pi}{2}\right)$

B. $\log_e 2$

C. $\log_e a$

D. a

Answer: C

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

A. 0

B. 1

C. -1

D. 2

Answer: B

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83. $\lim_{x \to \infty} \left(1 + \frac{2}{x}\right)^x$ equals

A. e

B. ∞

C. e^2

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

Answer: C

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84. $\lim_{n \to \infty} \left(1 + \sin. \frac{1}{n}\right)^n$ equals

A. e^a

B. e

C. $e^2 a$

D. 0

Answer: A

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85. The value of $\lim_{x \to 0} (1 + \sin x)^{2 \cot x}$, is

A. e

B. e^2

C. $\sqrt{e}$

D. none of these

Answer: B

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86. $\lim_{x \to 1} (\log_3 3x)^{\log_x 3} =$

A. e

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

C. 1

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

Answer: A

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87. The value of $\lim_{x \to 0} (\cos x)^{\cot x}$, is

A. e

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

C. 1

D. -1

Answer: C

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88. The value of $\lim_{x \to 0} \left\{ \frac{a^x + b^x + c^x}{3} \right\}^{1/x}$, is

A. abc

B. $(abc)^{1}/3$

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

D. none of these

Answer: B

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89. The value of $\lim_{x \to a} \left(2 - \frac{a}{x}\right)^{\tan\left(\frac{\pi x}{2a}\right)}$ is:

A. $e^{-1/\pi}$

B. $e^{2/\pi}$

C. $e^{-2/\pi}$

D. $e^{1/\pi}$

Answer: C

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90. The value of $\lim_{x \to 0} \left\{\tan\left(\frac{\pi}{4} + x\right)\right\}^{1/x}$, is

A. e

B. e^2

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

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

Answer: B

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91. The value of $\lim_{x \to 0} \left(\frac{\sin x}{x} \right)^{\frac{1}{x^2}}$, is

A. $e^{-1/3}$

B. $e^{1/3}$

C. $e^{-1/6}$

D. $e^{1/6}$

Answer: C

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92. $\lim_{x \to \infty} \left(\frac{x+5}{x-1} \right)^{x}$ is equal to

A. e^4

B. e^6

C. e^{-6}

D. e^{-4}

Answer: B

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93. $\lim_{x \to \infty} \left(\frac{x^2 + 4x - 3}{x^2 - 2x + 5} \right)^x$ is equal to

A. e^6

B. e^{-6}

C. e^2

D. e^4

Answer: A

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94. If $\lim_{x \to \infty} \left(\frac{x + c}{x - c} \right)^x = 4$ then the value of e^c is

A. $\log_{10} 2$

B. $\log_e 2$

C. 2

D. none of these

Answer: B

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

A. e^{12}

B. e^{-12}

C. e^4

D. e^3

Answer: B

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96. Let $p = \lim_{x \to 0^+} \left(1 + \tan^2 \sqrt{x}\right)^{\frac{1}{2x}}$. Then $\log_e p$ is equal to

A. 1

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

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

D. 2

Answer: B

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97. If $\lim_{x \to \infty} \left(1 + \frac{a}{x} - \frac{4}{x^2}\right)^{2x} = e^3$, the a is equal to

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

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

C. 2

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

Answer: B

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98. If $(\lim)_{x \to 0}\left[1+x1n\left(1+b^2\right)\right]^{\frac{1}{x}}=2b\sin^2\theta, b>0, smf\theta \in (-\pi, \pi]$, then the value of θ is $\pm\frac{\pi}{4}$ (b) $\pm\frac{\pi}{3}$ (c) $\pm\frac{\pi}{6}$ (d) $\pm\frac{\pi}{2}$

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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99. If $\lim_{x \to \infty} \left(1 + \frac{a}{x} + \frac{b}{x^2}\right)^{2x} = e^2$ then

A. $a = 1, b = 2$

B. $a = 2, b = 1$

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

D. $a = b = 1$

Answer: C

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100. $\lim_{x \to a} \frac{x^a - x^x}{x^x - a^a}$ is equal to

A. $\frac{1 + \log_e a}{1 - \log_e a}$

B. $\frac{\log_e (e/a)}{\log_e (ae)}$

C. $\frac{\log_e (a/e)}{\log_e (ae)}$

D. none of these

Answer: B

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101. Let $f(a) = g(a) = k$ and their nth derivatives exist and be not equal for some n.

If $\lim_{x \to a} \frac{f(a)g(x) - f(a) - g(a)f(x) + g(a)}{g(x) - f(x)} = 4$ then find the value of k.

A. 0

B. 4

C. 2

D. 1

Answer: B

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102. If $(\lim)_{x \to a} \frac{a^x - x^a}{x^x - a^a} = -1 and a > 0,$ then find the value of a.

A. 1

B. 0

C. e

D. none of these

Answer: A

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103. Evalaute $\lim_{x \to 1} \frac{1 + \log x - x}{1 - 2x + x^2}$

A. 1

B. -1

C. 0

D. none of these

Answer: D

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104. $\lim_{x \to 0} \frac{\tan x - x}{x^2 \tan x}$ equals

A. 1

B. $1/2$

C. $1/3$

D. none of these

Answer: C

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105. If $\lim_{x \to 0} \frac{ae^x - b\cos x + ce^{-x}}{x \sin x} = 2$,then $a + b + c =$

A. 2

B. 4

C. 0

D. 6

Answer: B

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106. $\lim_{xo \to 0} x \log_e(\sin x)$ is equal to

A. -1

B. $\log_e 1$

C. 1

D. none of these

Answer: B

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107. If $\lim_{x \to 0} \frac{\cos 4x + a \cos 2x + b}{x^4}$ is finite then the value of a, b respectively

A. $(5, -4)$

B. $(-5, -4)$

C. $(-4, 3)$

D. $(4, 5)$

Answer: C

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108. $\lim_{x \to 0} \frac{1 + x + x^2 - e^x}{x^2}$ is equal to

A. 1

B. 0

C. $1/2$

D. none of these

Answer: C

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109. Slove $\lim_{x \to 0} \frac{(1+x)^{1/x} - e}{x}$

A. 1

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

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

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

Answer: C

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110. Evaluate $\lim_{x \to 0} \frac{(1+x)^{1/x} - e + \frac{1}{2}es}{x^2}$.

A. $\frac{11e}{24}$

B. $\frac{-11e}{24}$

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

D. none of these

Answer: A

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111. The value of $\lim_{x \to 0} \frac{1 + \sin x - \cos x + \log(1 - x)}{x^3}$ is

A. -1

B. $1/2$

C. $-1/2$

D. 1

Answer: C

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112. The value of $\lim_{x \to 0} \frac{e^x + \log(1+x) - (1-x)^{-2}}{x^2}$ is equal to

A. 0

B. -3

C. -1

D. infinity

Answer: B

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Section I - Solved Mcqs

1. For $x \in R$, $(\lim)_{x \overrightarrow{\infty}} \left(\frac{x-3}{x+2}\right)^{\xi} sequa < o\, e$ (b) e^{-1} (c) e^{-5} (d) e^{5}

A. e

B. e^{-1}

C. e^{-5}

D. e^{5}

Answer: C

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

A. $-\pi$

B. π

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

D. 1

Answer: B

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3. The integer n for which $(\lim)_{x \overrightarrow{0}}\left((\cos x-1) \frac{\cos x-e \widehat{x}}{x^{n}}\right.$ is finite nonzero number is _____

A. 1

B. 2

C. 3

D. 4

Answer: C

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4. Let $f: R \rightarrow R$ be such that $f(1)=3$ and $f'(1)=6$. Then $\lim_{x \rightarrow 0}\left(\frac{f(1+x)}{f(1)}\right)^{1 / x}=$ (a)1 (b) $e^{\frac{1}{2}}$ (c) e^{2} (d) e^{3}

A. 1

B. $e^{1 / 2}$

C. e^2

D. e^3

Answer: C

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5. $\lim_{n \to \infty} \frac{a^n - b^n}{a^n + b^n}$, where $1 < b < a$, is equal to

A. 1

B. -1

C. 0

D. none of these

Answer: A

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6. $\lim_{x \to \infty} \frac{4^{1/n} - 1}{3^{1/n} - 1}$ is equal to

A. $\log_4 3$

B. $\log_3 4$

C. 1

D. none of these

Answer: B

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7. Evaluate a, b, c and d if

$$\lim_{x \to \infty} \left(\sqrt{x^4 + ax^3 + 3x^2 + bx + 2} - \sqrt{x^4 + 2x^3 - cx^2 + 3x - d} \right) = 4$$

A. 3

B. 5

C. 2

D. any real number

Answer: C

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8. if $\lim_{x \to 0} (1 + ax)^{\frac{b}{x}} = e^2$, where a and b are natural numbers, then

A. $a = 4, b = 2$

B. $a = 8, b = 4$

C. $a = 16, b = 8$

D. $a = 1, b = 2$

Answer: D

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9. $\lim_{n \to \infty} (2^n + 5^n)^{1/n}$ is equal to

A. 2

B. 5

C. e

D. none of these

Answer: B

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10. $\lim_{x \to \infty} \frac{\log[x]}{x}$, where $[x]$ denotes the greatest integer less than or equal to x, is

A. 0

B. 1

C. -1

D. non-existent

Answer: A

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11. $\lim_{x \to \infty} \frac{\log x}{[x]}$, where $[.]$ denotes the greatest integer function, is

A. 0

B. 1

C. -1

D. non -existant

Answer: A

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12. $\lim_{x \to \infty} \frac{\log x^n - [x]}{[x]}$ where $n \in N$ and $[.]$ denotes the greatest integer function, is

A. 1

B. -1

C. 0

D. none of these

Answer: B

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13. If $a.\ \lim_{x \to 1} x^{1/1-x} + b = e^{-1} (a \geq 1, b \geq 0)$, then

A. $a = 1, b = e^{-1}$

B. $a = 2, b = e^{-1}$

C. $a = -1, b = e^{-1}$

D. $a = 1, b = 0$

Answer: D

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14. $\lim_{x \to -1} \frac{\cos 2 - \cos 2x}{x^2 - |x|}$ is equaol to

A. 2

B. $\sin 2$

C. $2 \sin 2$

D. none of these

Answer: C

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15. $\lim_{x \to \infty} \left(\left(\frac{x}{x+1} \right)^a + \sin \left(\frac{1}{x} \right) \right)^x$ is equal to

A. $e^a - 1$

B. $e^1 - a$

C. e

D. 0

Answer: B

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16. If {x} denotes the fractional part of x, then $\lim_{x \to 0} \frac{\{x\}}{\tan\{x\}}$ is equal to

A. 1

B. 0

C. -1

D. none of these

Answer: D

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17. If $\{x\}$ denotes the fractional part of x, then $\lim_{x \to 1} \frac{x \sin\{x\}}{x - 1}$, is

A. 0

B. -1

C. non-extistent

D. none of these

Answer: C

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18. $\lim_{x \to 0+} \frac{\sin \sqrt{x}}{\sqrt{\sin x}}$ is equal to

A. 0

B. 1

C. -1

D. none of these

Answer: B

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19. If α and β are roots of the equation $ax^2 + bx + c = 0$, then $\lim_{x \to \alpha} \left(1 + ax^2 + bx + c\right)^{1/x - \alpha}$, is

A. $e^{a(\alpha - \beta)}$

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

C. 1

D. none of these

Answer: A

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20. If $f(x) = \frac{1}{3}\left(f(x+1) + \frac{5}{f(x+2)}\right)$ and $f(x) > 0$, $\forall x \varepsilon R$, then $\lim_{x \to \infty} f(x)$ is

A. $\sqrt{\frac{2}{5}}$

B. $\sqrt{\frac{5}{2}}$

C. ∞

D. none of these

Answer: B

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21. The value of $(\lim)_{x \to 0}\left(\left[\frac{100x}{\sin x}\right]+\left[\frac{99\sin x}{x}\right]\right)$ (where [.] represents the greatest integral function) is 199 (b) 198 (c) 0 (d) none of these

A. 199

B. 198

C. 0

D. none of these

Answer: B

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22. If F(x) = $\begin{cases} \frac{\sin\{\cos x\}}{x-\frac{\pi}{2}}, x \neq \frac{\pi}{2} \text{ and } 1, x = \frac{\pi}{2}, \end{cases}$ where {.} represents the fractional part function, then $\lim_{x \to \pi/2} f(x)$ is

A. -1

B. 1

C. non-existant

D. none of these

Answer: C

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23. The value of $\lim_{x \to \infty} 1 + \frac{1}{(x^n)^x}, n > 0,$ is

A. $1, \quad \text{if} \quad n < 1$

B. $1, \quad \text{if} \quad n > 1$

C. $e, \quad \text{if} \quad n > 1$

D. $e, \quad \text{if} \quad n < 1$

Answer: B

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24. $\lim (x \to a^-) \left\{ \frac{|x|^3}{a} - \left[\frac{x}{a}\right]^3 \right\}, (a > 0)$, where $[x]$ denotes the greatest integer less than or equal to x is equal to:

A. $a^2 - 3$

B. $a^2 - 1$

C. a^2

D. none of these

Answer: C

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25. $\lim_{x \to \infty} \frac{n^p \sin^2(n!)}{n+1}, 0 < p < 1$, is equal to

A. 0

B. ∞

C. 1

D. none of these

Answer: A

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26. If $\lim_{x \to 0} (\cos x + a \sin bx)^{1/x} = e^2$, then the values of a and b are

A. $a = 1, b = -2$

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

C. $a = 2\sqrt{2}, b = \frac{1}{xqrt(2)}$

D. $a = -2, b = 1$

Answer: C

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27. $\lim_{x \to 2} \frac{\sum_{r=1}^{n} x^r - \sum_{r=1}^{n} 2^r}{x - 2}$ is equal to

A. n

B. $(n-1)2^n$

C. $(n-1)2^n + 1$

D. none of these

Answer: C

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28. If α is a repeated root of $ax^2 + bx + c = 0$, then $\lim_{x \to \alpha} \frac{\sin(ax^2 + bc + c)}{(x - \alpha)^2}$ is equal to

A. 0

B. a

C. b

D. c

Answer: B

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29. If $f(x) = \begin{cases} \frac{\tan^{-1}(x+[x])}{[x]-2x}[x] \neq 0 \\ 0[x] = 0 \end{cases}$ where $[x]$ denotes the greatest integer less than or equal to x, than $\lim_{x \to 0} f(x)$ is (a) $\frac{-1}{2}$ (b) 1 (c) $\frac{\pi}{4}$ (d) Does not exist

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

B. 1

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

D. non-existent

Answer: D

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30. If $[.]$ denotes the greatest intger function, then $\lim_{x \to 0} \frac{\tan\left(\left[-2\pi^2\right]x^2\right) - x^2 \tan\left[-2\pi^2\right]}{\sin^2 x}$ is equal to

A. $20 + \tan 20$

B. $-20 + \tan 20$

C. 20

D. none of these

Answer: B

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31. $(\lim)_{x \overrightarrow{\infty}} \left[\frac{x^4 \sin\left(\frac{1}{x}\right) + x}{\left(1 + |x|^3\right)}\right. =$ _ _ _ _

A. 1

B. -1

C. 0

D. ∞

Answer: B

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32. $\lim_{n \to \infty} (1+x)\left(1+x^2\right)\left(1+x^4\right)\ldots\ldots\ldots\ldots\ldots\left(1+x^{2n}\right), |x| < 1$ is

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

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

C. $1-x$

D. $x-1$

Answer: B

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33. If $\phi(x) = \lim_{n \to \infty} \frac{x^{2n}(f(x) + g(x))}{1 + x^{2n}}$ then which of the following is correct

A. $\phi(x) = g(x) \text{for all} x \in R$

B. $\phi(x) = f(x) \text{for all} x \in R$

C. $\phi x = \begin{cases} g(x) \text{for} -1 < x < 1 \\ f(x) \text{for} |x| \geq 1 \end{cases}$

D. $\phi x = \begin{cases} g(x) \text{for} |x| < 1 \\ f(x) \text{for} |x| > 1 \\ \frac{f(x) + g(x)}{2} \text{for} |x| = 1 \end{cases}$

Answer: D

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34. The value of $\lim_{x \to \pi/2} \left\{ 1^{\sec^2 x} + 2^{\sec^2 x} + 3^{\sec^2 x} + \ldots\ldots\ldots + n^{\sec^2 x} \right\}^{\cos^2 x}$ is

A. 0

B. n

C. ∞

D. $\frac{n(n+1)}{2}$

Answer: B

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35. If $l = \lim_{x \to 0} \frac{\tan x^n}{(\tan x)^m}$, where $m, n \in N$, then

A. $l = 1$ for all $m, n \in N$

B. $l = \begin{cases} 1 & \text{if } n > m \\ 0 & \text{if } n < m \end{cases}$

C. $l = \begin{cases} 1 & \text{if } n = m \\ 0 & \text{if } n > m \end{cases}$

D. $l = 0$ for all $m, n \in N$

Answer: C

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36. If $\lim_{x \to \infty} \frac{(1+a^3)+8e^{\frac{1}{x}}}{1+(1-b^3)e^{\frac{1}{x}}} = 2,$ then there exists

A. $a = 1, b = (-3)^{1/3}$

B. $a = 1, b = 3^{1/3}$

C. $a = -1, b = -(3)^{1/3}$

D. none of these

Answer: A

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

A. 1

B. $\sqrt{2/3}$

C. $\sqrt{3/2}$

D. $e^{1/2}$

Answer: B

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38. $\lim_{x \to e} \frac{\log_e x - 1}{|x - e|}$ is

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

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

C. e

D. none -existent

Answer: D

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39. The value of $\lim_{n \to \infty} \left[\frac{1}{n} + \frac{e^{1/n}}{n} + \frac{e^{2/n}}{n} + \ldots + \frac{e^{(n-1)/n}}{n} \right]$ is

A. e

B. $-e$

C. $e-1$

D. $1-e$

Answer: C

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40. If the graph of the function $y=f(x)$ has a unique tangent at the point $(a,0)$ through which the graph passes, then evaluate $(\lim)_{x \to a} \frac{(\log)_e\{1+6f(x)\}}{3f(x)}$

A. 1

B. 0

C. 2

D. none of these

Answer: C

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41. Let $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3 + 3x^2 - 7$, then the value of $\lim_{h \to 0} \frac{f(1-h) - f(1)}{h^3 + 3h}$

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

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

C. 13

D. none of these

Answer: A

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42. Let $a = \min \left\{x^2 + 2x + 3, x \varepsilon R\right\}$ and $b = \lim_{x\theta \to 0} \frac{1 - \cos\theta}{\theta^2 0}$. The value fo $\sum_{r=0}^{n} a^r . b^{n-r}$ is

A. $\frac{2^{n+1} - 1}{3 \times 2^n}$

B. $\frac{2^{n+1}+1}{3\times 2^n}$

C. $\frac{4^{n+1}-1}{3\times 2^n}$

D. none of these

Answer: C

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43. $\lim_{n\to\infty}\left\{\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots..+\frac{1}{(2n+1)(2n+3)}\right.$ is equal to

A. 1

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

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

D. none of these

Answer: B

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44. If $\lim_{x \to 0} \frac{(\sin(\sin x) - \sin x)}{ax^3 + bx^5 + c} = -\frac{1}{12}$, then:

A. $a = 2, b = \in R, c = 0$

B. $a = -2, b \in R, c = 0$

C. $a = 1, b = \in R, c = 0$

D. $a = -1, b \in R, c = 0$

Answer: A

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45. $\lim_{x \to 0^-} \frac{[x] + [x^2] + [x^3] + + [x^{2n+1}] + n + 1}{1 + [x^2] + |x| + 2x}$, $n \in N$ is equal to

A. $n + 1$

B. n

C. 1

D. 0

Answer: D

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46. $\lim_{x \to \alpha} (\tan x \cot \alpha)^{\frac{1}{x-\alpha}}$ is equal to

A. $2 \cos ec 2\alpha$

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

C. $-2 \cos ec 2\alpha$

D. none of these

Answer: D

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47.

$$\lim_{x \to a} \left\{ \left[\left(\frac{a^{1/2} + x^{1/2}}{a^{1/4} - x^{1/4}} \right)^{-1} - \frac{2(ax)^{1/4}}{x^{3/4} - a^{1/4}x^{1/2} + a^{1/2}x^{1/4} - a^{3/4}} \right]^{-1} -

is

A. a

B. $a^{3/4}$

C. a^2

D. $\sqrt{a}$

Answer: C

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48. The value of $\lim_{n \to \infty} \left\{3\sqrt{n^2 - n^3} + n\right\}$, is

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

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

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

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

Answer: A

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49. Let $f(x) = [x] + [-x]$, where $[x]$ denotes the greastest integer less than or equal to x . Then, for any integer m

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

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

C. $\lim_{x \to m} f(x)$ does not exist

D. none of these

Answer: B

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50. If $[.]$ denotes the greatest integer function , then $\lim_{x \to 0} \frac{\sin[-\sec^2 x]}{1 + [\cos x]}$ is equal to

A. $\sin 1$

B. $-\sin 1$

C. $\sin 2$

D. none of these

Answer: D

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51. Evaluate $\lim_{x \to 0} \left\{1^{1/\sin^2 x} + 2^{1/\sin^2 x} + \ldots + n^{1/\sin^2 x}\right\}^{\sin^2 x}$.

A. ∞

B. 0

C. n

D. $\frac{n(n+1)}{2}$

Answer: C

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52. The value of $\lim (x \to \pi/2) \frac{\left[\frac{x}{2}\right]}{\log(\sin x)}$ is equal to

A. does not exist

B. equals 1

C. equals 0

D. equals -1

Answer: C

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53. If [.] denotes the greatest integer function then $\lim_{x \to 0} \left[\frac{x^2}{\tan x . \sin x}\right]$ =

A. 0

B. 1

C. -1

D. non-existent

Answer: B

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54. $\lim_{x \to 0} \left[\frac{100 \tan x \sin x}{x^2} \right]$ is (where $[.]$ represents greatest integer function).

A. 99

B. 100

C. 0

D. non-existent

Answer: A

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55. $\lim_{x \to \infty} \left\{ \frac{1^2}{1-x^3} + \frac{3}{1+x^2} + \frac{5^2}{1-x^3} + \frac{7}{1+x^2} + ... \right)$ is equal to

A. $-\frac{5}{6}$

B. $-\frac{10}{3}$

C. $\frac{5}{6}$

D. none of these

Answer: B

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56. If $f(x)=\begin{vmatrix}\sin x & \cos x & \tan x\\ x^3 & x^2 & x\\ 2x & 1 & x\end{vmatrix}$, then $\lim_{x\to 0}\frac{f(x)}{x^2}=$

A. -1

B. 3

C. 1

D. 0

Answer: C

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57. If $\lim_{x \to 0} \frac{\{(a-n)nx - \tan x\}\sin nx}{x^2} = 0$, where n is non zero real number then a is equal to

A. 0

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

C. n

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

Answer: D

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

A. 0

B. 3

C. 2

D. 1

Answer: D

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59. Let the sequence $< b_n >$ of real numbers satisfy the recurrence relation $b_{n+1} = \frac{1}{3}\left(2b_n + \frac{125}{b_n^2}\right), b_n \neq 0$. Then find $\lim_{n \to o0} b_n$.

A. 0

B. ∞

C. 5

D. $2/3$

Answer: C

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60. 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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61. Find the value of α so that $(\lim)_{x \to 0} \frac{1}{x^2}(e^{\alpha x} - e^x - x) = \frac{3}{2}$

A. 1

B. 0

C. 4

D. 2

Answer: D

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62. $\lim_{x \to 0} x^8 \left[\frac{1}{x^3}\right]$, where $[.]$,denotes the greatest integer function is

A. a non-zero positive real number

B. a negative real number

C. 0

D. non-existent

Answer: C

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63. Let $f: R \to R$ be a positive, increasing function with $\lim_{x \to \infty} \frac{f(3x)}{f(x)} = 1$. Then $\lim_{x \to \infty} \frac{f(2x)}{f(x)}$ is equal to

A. $3/2$

B. 3

C. 1

D. $2/3$

Answer: C

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

A. 1

B. 2

C. 3

D. 0

Answer: C

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65. Let

$$f(\theta) - \frac{1}{\tan^2\theta}\left\{(1+\tan\theta)^3 + (2+\tan\theta)^3 + \ldots + (10+\tan\theta)^3\right\} - 10t$$

Then $\lim_{\theta \to \left(\frac{\pi-0}{2}\right)} f(\theta)$ is equal to

A. 1900

B. 2000

C. 2100

D. 2200

Answer: C

Watch Video Solution

66. Let $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3 + 3x^2 - 7$, then the value of $\lim_{h \to 0} \frac{f(1-h) - f(1)}{h^3 + 3h}$

A. $\frac{-55}{3}$

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

C. $-\frac{53}{3}$

D. $\frac{55}{3}$

Answer: B

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67. The largets value of non negative integer for which $\lim_{x \to 1} \left\{ \frac{-ax + \sin(x-1) + a}{x + \sin(x-1) - 1} \right\}^{\frac{1-x}{1-\sqrt{x}}} = \frac{1}{4}$

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

68. about to only mathematics

A. 2

B. 4

C. 6

D. 9

Answer: A

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69. $\lim_{x \to \infty} \left\{3\sqrt{(x+a)(x+b)(x+c)} - x\right\} =$

A. $\sqrt{abc}$

B. $\frac{a+b+c}{3}$

C. abc

D. $(abc)^{\frac{1}{3}}$

Answer: B

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70. $(\lim)_{n \to \infty}\{\left(\frac{n}{n+1}\right)^{\alpha} + \sin\left(\frac{1}{n}\right)\Big]^{n}$ (when $\alpha \in Q$) is equal to (a) $e^{-\alpha}$ (b) $-\alpha$ (c) $e^{1-\alpha}$ (d) $e^{1+\alpha}$

A. e^{α}

B. $-\alpha$

C. $e^{1} - \alpha$

D. $e^1 + \alpha$

Answer: C

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71. The value of $\lim_{n \to \infty} \frac{1^2.n + 2^2.(n-1) + ... + n^2.1}{1^3 + 2^3 + ... + n^3}$ is equal to

A. $1/3$

B. $2/3$

C. $1/2$

D. $1/6$

Answer: A

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72. $\lim_{n \to \infty} \left(\frac{n\sqrt{a} + n\sqrt{b}}{2} \right)^n, a, b, > 0$ equals

A. 1

B. $\sqrt{ab}$

C. ab

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

Answer: B

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73. $\lim_{x \to \infty} \frac{\cot^{-1}\left(\sqrt{x+1}+\sqrt{x}\right)}{\sec^{-1}\left\{\left(\frac{2x+1}{x-1}\right)^{x}\right\}} =$

A. 1

B. 0

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

D. non-existent

Answer: A

Watch Video Solution

74. $\lim_{x \to 1} \frac{x^{2^{32}} - 2^{32}x + 4^{16} - 1}{(x-1)^2}$ is equal to

A. $2^{63} - 2^{31}$

B. $2^{64} - 2^{31}$

C. $2^{62} - 2^{31}$

D. $2^{65} - 2^{33}$

Answer: B

Watch Video Solution

75. The value of $\lim_{x \to \infty} \left(3\sqrt{x^3 + x^2} - 3\sqrt{x^3 - x^2}\right)$, is

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

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

C. 1

D. $\frac{4}{3}$

Answer: B

Watch Video Solution

76. If $\lim_{x \to -1} \frac{\sin\left(x^3 + bx^2 + cx + d\right)}{\left(\sqrt{2+x} - 1\right)\{\log_e(x+2)\}^2}$ exists and is equal to l, then $b + d + l$ is equal to

A. 5

B. 6

C. 7

D. 4

Answer: B

Watch Video Solution

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

A. 2

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

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

D. 5

Answer: B

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78. The value of $\lim_{x \to 0} \frac{\log_e(1+x) - x}{x\left\{(1+x)^{1/x} - e\right\}}$ equal to

A. e^e

B. e

C. $1/e$

D. 1

Answer: C

Watch Video Solution

79. The value of $\lim_{x \to 0} \frac{\sin(\sin x) - \tan(\sin x)}{\sin^3(\sin x)}$, is

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

B. -1

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

D. 1

Answer: A

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80. The value of $\lim_{x \to \infty} x\left\{\frac{1}{e} - \left(\frac{x}{x+1}\right)^x\right\}$, is

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

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

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

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

Answer: C

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81. The value of $\lim_{x \to 1} \left\{ \frac{x^n - 1}{n(x-1)} \right\}^{\frac{1}{x-1}}$, is

A. $e^{1/2}$

B. $e^{\frac{n}{x-1}}$

C. $e^{\frac{n-1}{2}}$

D. $e^{\frac{n+1}{2}}$

Answer: C

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82. If the equation of the normal to the curve $y = f(x) at x = 0$ is $3x - y + 3 = 0$ then the value of

$$\lim_{x \to 0} \frac{x^2}{\{f(x^2) - 5f(4x^2) + 4f(7x^2)\}}$$ is

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

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

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

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

Answer: B

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83. If $\lim_{x \to 1} \frac{(a \sin(x-1) + b \cos(x-1) + 4)}{x^2 - 1} = 2$, then (a, b) is equal to

A. $(2, 3)$

B. $(a, -4), a \in R$

C. $(3, -b), b \in R$

D. $(4, -4)$

Answer: D

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84. If $a > 0$ and $\lim_{x \to \infty} \left\{ \sqrt{x^2 + x + 1} - (ax + b) \right\} = 0$, then (a, b) lies on the line.

A. $x - y + 3 = 0$

B. $3x + 4y - 5 = 0$

C. $x + 6y + 2 = 0$

D. $x + 2y + 3 = 0$

Answer: B

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85. If α, β are two distinct real roots of the equation $ax^3 + x - 1 - a = 0 (a \neq -1, 0)$, none of which is equal to unity. If the value of $\lim_{x \to \frac{1}{\alpha}} \frac{(1+a)x^3 - x^2 - a}{(e^{1-\alpha x} - 1)(x-1)}$ is $\frac{al(k\alpha - \beta)}{\alpha}$ the value of kl

A. 1

B. 2

C. 3

D. 4

Answer: A

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86. Let $f(x) = \frac{\log_e (x^2 + e^x)}{\log_e (x^4 + e^2 x)}$. If $\lim_{x \to \infty} f(x) = l$ and $\lim_{x \to -\infty} f(x) = m$, then

A. $l = m$

B. $l = 2m$

C. $2l = m$

D. $l + m = 0$

Answer: A

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87. $\lim_{n \to \infty} \left(\frac{n\sqrt{p} + n\sqrt{q}}{2} \right)^n, p, q, > 0$ equals

A. 1

B. $\sqrt{pq}$

C. pq

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

Answer: B

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88. The value of $\lim_{x \to 0} \frac{e^x - \cos 2x - x}{x^2}$, is

A. 2

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

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

D. $\frac{5}{2}$

Answer: D

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89. $\lim_{x \to 0} \frac{2^{|x|} e^{|x|} - |x| \log_2 2 - 1}{x \tan x}$ is equal to

A. $\frac{1}{2}(In2)^2 + \frac{1}{2}(In2) + 1$

B. $(In2)^2 + \frac{1}{2} + \frac{1}{2}(In2) + 1$

C. $(In2)^2 + (In2) + \frac{1}{2}$

D. $\frac{1}{2}(In2)^2 + (In2) + \frac{1}{2}$

Answer: D

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90. $I\frac{f(\lim)_{x\overrightarrow{\infty}}(n.3^n)}{n(x-2)^n+n.3^{n+1}-3^n}=\frac{1}{3},thenthe$ range of x is (where $n\in N)\cdot$ (a) (2,5) (b) (1,5) (c) $-5,5)$ (d) $(-\infty,\infty)$

A. 3

B. 4

C. 5

D. infinite

Answer: C

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91. The value of $\lim_{x \to \infty} \frac{2x^{1/2} + 3x^{1/3} + 4x^{1/4} + \ldots\ldots\ldots\ldots + nx^{1/n}}{(2x-3)^{1/2} + (2x-3)^{1/3} + \ldots\ldots\ldots + (2x-3)^{1/n}}$ is

A. 0

B. 2

C. $\sqrt{2}$

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

Answer: C

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92. If A,B,C are positive real numbers such that $\lim_{x \to \infty} \left(\sqrt{Ax^2 + Bx} - Cx\right) = 2, then \frac{BC}{A}$ equals

A. 4

B. 2

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

D. `none of these

Answer: A

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93. Let $k > 0$ and $\lambda = \lim_{x \to 0} \frac{k\left(1 - 4\sqrt{k^2 - x^2}\right)}{x^2\sqrt{k^2 - x^2}}$ be finite. Then the value of λk, is

A. $\lambda = 8, k = \frac{1}{2}$

B. $\lambda = 8, k = \frac{1}{4}$

C. $\lambda = 4, k = \frac{1}{2}$

D. $6\lambda = 4, k = \frac{1}{4}$

Answer: B

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94. If $f(x)=0$ is a quadratic equation such that $f(-\pi)=f(\pi)=0$ and $f\left(\frac{\pi}{2}\right)=-\frac{3\pi^2}{4}$, then $\lim_{x\to-\pi}\frac{f(x)}{\sin(\sin x)}$ is equal to (a)0 (b) π (c) 2π (d) none of these

A. 0

B. π

C. 2π

D. none of these

Answer: C

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95. If $\lim_{x\to0}\frac{x^n-\sin x^n}{x-\sin^n x}$ is non-zero finite, then n must be equal to 4 (b) 1 (c) 2 (d) 3

A. 1

B. 2

C. 3

D. none of these

Answer: B

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96. If $\lim_{x \to \infty} \left(8x^3 + mx^2\right)^{1/3} - nx$ exists and is equal to 1 , then the vlaue of $\frac{m}{n}$ is

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

B. 6

C. 3

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

Answer: B

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97. If $P(x)$ is a polynomial such that $P(x) + P(2x) = 5x^2 - 18$, then $\lim_{x \to 3} \frac{P(x)}{x - 3}$, is

A. 6

B. 9

C. 18

D. 0

Answer: A

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98. If $f(x) = \lim_{n \to \infty} \sum_{r=0}^{n} \frac{\tan\left(\frac{x}{2^{r+1}}\right) + \tan^3\left(\frac{x}{2^{r+1}}\right)}{1 - \tan^2\left(\frac{x}{2^{r+1}}\right)}$ then $\lim_{x \to 0} \frac{f(x)}{x}$ is

A. 1

B. 0

C. -1

D. none of these

Answer: A

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99. Let f(x) is a polynomial function and $f(\alpha))^2 + f'(\alpha))^2 = 0$, then find $\lim_{x \to \alpha} \frac{f(x)}{f'(x)} \left[\frac{f'(x)}{f(x)} \right]$, where [.] denotes greatest integer function, is.....

A. 0

B. 1

C. -1

D. $f(\alpha) f'(\alpha)$

Answer: B

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100. If $f:[-1,1] \to R$ and $f'(0) = \lim_{n \to \infty} nf\left(\frac{1}{n}\right)$ and $f(0) = 0$. Find the value of $\lim_{n \to \infty} \frac{2}{\pi}(n+1)\cos^{-1}\left(\frac{1}{n}\right) - n$ given that $0 < \left| \lim_{\to \infty} \cos^{-1}\left(\frac{1}{n}\right) \right| < \frac{\pi}{2}$.

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

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

C. 1

D. 0

Answer: B

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101. Let $f(x) = \begin{cases} \frac{\tan^2\{x\}}{x^2 - [x]^2} & \text{for} x > 0 \\ \frac{1}{\sqrt{\{x\}\cot\{x\}}} & \text{for} x < 0 \end{cases}$ where $[x]$ is the step up function and $\{x\}$ is the fractional part function of x then

A. $\lim_{x \to 0^+} f(x) = 1$

B. $\lim_{x \to 0^-} f(x) = 1$

C. $\cot^{-1}\left\{\lim_{x \to 0^-} f(x)\right\}^2 = \frac{\pi}{4}$

D. All of these

Answer: D

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Section II - Assertion Reason Type

1. Statement -1 : $\lim_{x \to \alpha} \frac{\sqrt{1 - \cos 2(x - \alpha)}}{x - \alpha}$ does not exist.

Statement-2 : $\lim_{x \to 0} \frac{|\sin x|}{x}$ does not exist.

A. Statement -1 is true, Statement-2 is true,, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for statement -1.

C. Statement-1 is true, Statement-2 is False.

D. Statement-1 is False, Statement-2 is true.

Answer: A

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2. Statement -1: $\lim_{x \to \pi/2} \frac{\cot x - \cos x}{(2x - \pi)^3} = -\frac{1}{16}$ Statement 2 $\lim_{x \to 0} \frac{\tan x - \sin x}{x^3} = \frac{1}{2}$

A. Statement -1 is true, Statement-2 is true,, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for statement -1.

C. Statement-1 is true, Statement-2 is False.

D. Statement-1 is False, Statement-2 is true.

Answer: A

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3. Statement -1: If a and b are positive real numbers and $[.]$ denotes the greatest integer function , then

A. Statement -1 is true, Statement-2 is true,, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for statement -1.

C. Statement-1 is true, Statement-2 is False.

D. Statement-1 is False, Statement-2 is true.

Answer: A

View Text Solution

4. Statement-1 :

$$\lim_{x \to \infty} \frac{(x+1)^{10} + (x+2)^{10} + \ldots . + (x+100)^{10}}{x^{10} + 9^{10}} = 100$$

Statement -2 : If $f(x)$ and $g(x)$ are polynomials of same degree, then

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = \frac{\text{Coefficient of leading term in} f(x)}{\text{Coefficient of leading term in} g(x)}$$

A. Statement -1 is true, Statement-2 is true,, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for statement -1.

C. Statement-1 is true, Statement-2 is False.

D. Statement-1 is False, Statement-2 is true.

Answer: A

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5. Statement-1: $\lim_{x \to \infty} \left(\frac{\cos(\pi)}{x} \right)^x = 1$

Statement-2: $\lim_{x \to \infty} -\pi \tan. \frac{\pi}{x} = 0$

A. Statement -1 is true, Statement-2 is true,, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for statement -1.

C. Statement-1 is true, Statement-2 is False.

D. Statement-1 is False, Statement-2 is true.

Answer: B

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Exercise

1. $\lim_{x \to \infty} \left(\sqrt{x^2 + 2x - 1} - x \right) =$

A. ∞

B. $1/2$

C. 4

D. 1

Answer: D

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2. If $l_1 = \lim_{x \to -2} (x + |x|), l_2 = \lim_{x \to -2} (2x + |x|)$ and $l_3 = \lim_{x \to \pi/2} \frac{\cos x}{x - \pi/2}$, then

A. $l_1 < l_2 < l_3$

B. $l_2 < l_3 < l_1$

C. $l_3 > l_2 > l_1$

D. $l_1 < l_3 < _2$

Answer: B

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

A. 1

B. -1

C. 0

D. none of these

Answer: A

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4. $\lim_{x \to 0} x^2 \sin. \frac{\pi}{x}$, is

A. 1

B. 0

C. non-existant

D. ∞

Answer: B

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5.

$(\lim)_{x \to 2}\left(\left(\frac{x^3-4x}{x^3-8}\right)^{-1}-\left(\frac{x+\sqrt{2x}}{x-2}-\frac{\sqrt{2}}{\sqrt{x}-\sqrt{2}}\right)^{-1}\right) isequa < o$

$\frac{1}{2}$ (b) 2 (c) 1 (d) none of these

A. $1/2$

B. 2

C. 1

D. none of these

Answer: A

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6. Let $L = (\lim)_{x \to 0} \dfrac{a - \sqrt{a^2 - x^2} - \frac{x^2}{4}}{x^4}, a > 0. If Li \in ite, then\ a = 2$ (b) $a = 1\ L = \dfrac{1}{64}$ (d) $L = \dfrac{1}{32}$

A. $a = 2, L = \dfrac{1}{64}$

B. $a = 1, L = \dfrac{1}{64}$

C. $A = 3, L = \dfrac{1}{32}$

D. $a = 1, L = \dfrac{1}{32}$

Answer: A

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7. If $\lim\limits_{x \to \infty} \left(\dfrac{x^2 + 1}{x + 1} - ax - b \right) = 2$ find the values of a and b.

A. $a = 1, b = 1$

B. $a = 1, b = 2$

C. $a = 1, b = -2$

D. none of these

Answer: C

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8. Evaluate the following limits :

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

A. 1

B. 0

C. -1

D. none of these

Answer: B

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9. $\lim_{x \to 0} \frac{e^{x^2} - \cos x}{x^2}$ is equal to

A. $3/2$

B. $1/2$

C. $2/3$

D. none of these

Answer: A

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10. Write the value of $\left(\lim\right)_{x \to -\infty} \left(3x + \sqrt{9x^2 - x}\right)$

A. $1/3$

B. $1/6$

C. $-1/6$

D. $-1/3$

Answer: B

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11. $\lim_{x \to \frac{\pi}{4}} \frac{\int_2^{\sec^2 x} f(t)dt}{x^2 - \frac{\pi^2}{16}}$ is equal to

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

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

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

D. $4f(2)$

Answer: A

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12. The value of $\lim_{x \to 2} \frac{2^x + 2^{3-x} - 6}{\sqrt{2^{-x}} - 2^{1-x}}$ is

A. 16

B. 8

C. 4

D. 2

Answer: B

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13. value of $\lim_{x \to 0} \frac{1 - \cos^3 x}{x \sin x \cdot \cos x}$ is

A. $2/5$

B. $3/5$

C. $3/2$

D. $3/4$

Answer: C

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14. $\lim_{x \to 1} \dfrac{\sqrt{1} - \cos 2(x-1)}{x-1}$, is

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 because left hand limit is not equal to right hand limit

Answer: D

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15. Evaluate the following limits

(i) $\lim_{x \to \frac{\pi}{2}} \tan^2 x \left[\sqrt{2\sin^2 x + 3\sin x + 4} - \sqrt{\sin^2 x + 6\sin x + 2}\right]$

(ii) $\lim_{\theta \to 0} \dfrac{\sqrt{1+\sin 3\theta} - 1}{\ln(1+\tan 2\theta)}$

(iii) $\lim_{x \to 0} \dfrac{\sqrt{1+x} - \sqrt[3]{1+x}}{x}$

(iv) $\lim_{\phi \to 0} \dfrac{8}{\phi^8}\left(1 - \dfrac{\cos(\phi^2)}{2} - \dfrac{\cos(\phi^2)}{4} + \dfrac{\cos(\phi^2)}{2} \cdot \dfrac{\cos(\phi^2)}{4}\right)$

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

B. $\frac{1}{11}$

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

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

Answer: C

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16. The value of $\lim_{x \to 0} \frac{1 - \cos(1 - \cos x)}{x^4}$ is equal to

A. $(1)(8)$

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

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

D. none of these

Answer: A

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

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

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

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

D. $(1/2)$

Answer: B

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18. The value of $\lim_{x \to 1} (2 - x)^{\tan\left(\frac{\pi x}{2}\right)}$ is

A. $e^{-2/\pi}$

B. $e^{1/\pi}$

C. $e^{2/\pi}$

D. $e^{-1/\pi}$

Answer: C

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19. The value of $\lim_{x \to \infty} \left(\frac{3x-4}{3x+2} \right)^{\left(\frac{x+1}{3} \right)}$ is

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

B. $e^{-1/3}$

C. e^{-2}

D. e^{-1}

Answer: A

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

A. e^2

B. e^{-2}

C. e^6

D. none of these

Answer: A

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21. The value of $\lim_{x \to 0} \left(\frac{1 + \tan x}{1 + \sin x} \right)^{\cos ecx}$, is

A. 1

B. $-\sqrt{2}$

C. e^{-1}

D. none of these

Answer: A

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22. $\lim_{x \to 0} \left(\frac{5x^2 + 1}{3x^2 + 1} \right)^{1/x^2}$

A. e^2

B. e

C. e^{-1}

D. none of these

Answer: A

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23. Evaluate: $(\lim)_{n \to \infty} x \left[\tan^{-1} \left(\frac{x+1}{x+2} \right) - \tan^{-1} \left(\frac{x}{x+2} \right) \right]$

A. 1

B. -1

C. $1/2$

D. $-1/2$

Answer: C

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

A. $3/2$

B. 1

C. -1

D. none of these

Answer: B

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25. $(\lim)_{x \to 0} \frac{1n(1+2h) - 21n(1+h)}{h^2} =$ _ _

A. 1

B. -1

C. 0

D. none of these

Answer: B

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26. The value of $\lim_{x \to 1} (\log_5 5x)^{\log_x 5}$, is

A. 1

B. e

C. -1

D. none of these

Answer: B

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27. The value of $\lim_{x \to 1} (\log_2 2x)^{\log_x 5}$, is

A. $5/2$

B. $e^{\log 2} 5$

C. $\log 5 / \log 2$

D. $e^{\log a} r 5^2$

Answer: B

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28. $\lim_{x \to 0} \frac{\sin x^n}{(\sin x)^m}, (m < n),$ is equal to (a) 1 (b) 0 (c) n/m (d) none of these

A. 1

B. 0

C. n/m

D. none of these

Answer: B

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29. If $0 < x < y$, then $\lim_{x \to \infty} (y^n + x^n)^{1/n}$ is equal to

A. e

B. x

C. y

D. none of these

Answer: C

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30. Evaluate the limit: $(\lim)_{x \to \infty} \left[\sqrt{a^2x^2 + ax + 1} - \sqrt{a^2x^2 + 1}\right]$

A. $1/2$

B. 1

C. 2

D. none of these

Answer: A

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31. $\lim_{x \to 1} (1-x)\tan\left(\frac{\pi x}{2}\right)$ is equal to

A. $\pi/2$

B. $\pi + 2$

C. $2/\pi$

D. none of these

Answer: C

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32. The value of $\lim_{x \to 0} \frac{x(5^x - 1)}{1 - \cos x}$, is

A. $5 \log 2$

B. $2 \log 5$

C. $\frac{1}{2} \log 5$

D. $\frac{1}{5} \log 2$

Answer: B

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33. Evaluate $\lim_{x \to 2} \frac{\sin\left(e^{x-2} - 1\right)}{\log(x - 1)}$

A. -2

B. -1

C. 0

D. 1

Answer: D

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

A. 0

B. 1

C. -1

D. none of these

Answer: A

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35. If $f(x) = \left(\frac{x^2+5x+3}{x^2+x+2}\right)^x$ then $\lim_{x\to\infty} f(x)$ is equal to

A. e^4

B. e^3

C. e^2

D. 24

Answer: A

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36. The value of $\lim_{x\to\infty} a^x \sin\left(\frac{b}{a^x}\right)$ is $(a > 1)$

A. blog a

B. a log b

C. b

D. none of these

Answer: C

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37. The value of $\lim_{x \to 0} \frac{|x|}{x}$, is

A. 1

B. -1

C. 0

D. none of these

Answer: D

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38. Find : $\lim_{x \to 0} \frac{\sin x - x + \frac{x^3}{6}}{x^3}$

A. 0

B. 1

C. $1/60$

D. $1/120$

Answer: D

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39. The value of $\lim_{x \to \infty} x^{1/x}$ equals

A. 0

B. 1

C. e

D. e^{-1}

Answer: B

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40. The value of $\lim_{x \to 0} \frac{1 + \sin x - \cos x + \log(1 - x)}{x^3}$ is

A. $1/2$

B. $-1/2$

C. 0

D. 1

Answer: B

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41. Discuss the continuity of $f(x) = \left(\lim \right)_{n \to \infty} \frac{x^{2n} - 1}{x^{2n} + 1}$

A. $f(x) = \begin{cases} 1 & |x| > 1 \\ -1 & |x| > 1 \end{cases}$

B. $f(x) = \begin{cases} 1 & |x| < 1 \\ -1 & |x| > 1 \end{cases}$

C. $f(x)$ is not defined for any value of x

D. $f(x) = 1 \quad \text{for} \quad |x| = 1$

Answer: A

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42. $\lim_{x \to 0} \frac{x \cos x - \log(1+x)}{x^2}$ equals

A. $1/2$

B. 0

C. 1

D. $-1/2$

Answer: A

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43. about to only mathematics

A. 0

B. ∞

C. 1

D. none of these

Answer: C

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44. $\lim_{x \to 0} \frac{(1 - \cos 2x)\sin 5x}{x^2 \sin 3x}$ equals

A. $10/3$

B. $3/10$

C. $6/5$

D. $5/6$

Answer: A

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45. $\lim_{x \to \infty} \left(\frac{x+2}{x+1} \right)^{x+3}$ is equal to

A. 1

B. e

C. e^2

D. e^3

Answer: B

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46. The value of $\lim_{x \to \infty} \left(\frac{x+3}{x-1} \right)^{x+1}$ is

A. e

B. e^2

C. e^4

D. $1/e$

Answer: C

Watch Video Solution

47. The value of $\lim_{x \to \infty} \frac{\sin x}{x}$, is

A. 1

B. 0

C. -1

D. none of these

Answer: B

Watch Video Solution

48. The value of $\lim_{x \to \infty} \left(\frac{x+6}{x+1} \right)^{x+4}$, is

A. e

B. e^2

C. e^4

D. e^5

Answer: D

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49. $\lim_{x \to 0} \frac{\sin 4x}{1 - \sqrt{1 - x}}$, is

A. 4

B. 8

C. 10

D. 2

Answer: B

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50. If $G(x) = -\sqrt{25-x}$. Then $\lim_{x \to 1} \frac{G(x) - G(1)}{x - 1}$ has the value

A. $\frac{1}{\sqrt{24}}$

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

C. $-\sqrt{24}$

D. $-1/5$

Answer: A

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51. $\lim_{x \to 0^-} \frac{\sin x}{\sqrt{x}}$ is equal to

A. 0

B. 1

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

D. none of these

Answer: D

Watch Video Solution

52. $\lim_{n \to \infty} \left(\frac{1}{n^2+1} + \frac{2}{n^2+2} + \frac{3}{n^2+3} + ... \frac{n}{n^2+n} \right)$

A. 0

B. $-1/2$

C. $1/2$

D. 1

Answer: B

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53. Evaluate $\lim_{x \to -1^+} \frac{\sqrt{\pi} - \sqrt{\cos^{-1} x}}{\sqrt{1+x}}$.

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

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

C. 1

D. 0

Answer: B

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54. $f(x) = \lim_{m \to \infty} \left\{ \lim_{n \to \infty} \cos^{2m} n! \pi x \right\}$ then

A. 2 or 1 according as x is rational or irrational

B. 1 or 2 according as x is rational or irrational

C. 1 for all x

D. 2 or 1 for all x

Answer: A

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55. $\lim_{x \to 1} \frac{\sin\left(e^{x-1}-1\right)}{\log x}$ is equal to

A. 1

B. 0

C. e

D. e^{-1}

Answer: A

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56. The value of $\lim_{x \to \infty} \left(\frac{x-1}{x+1}\right)^{x}$, is

A. 0

B. e^{-1}

C. e^{-2}

D. e^{-3}

Answer: C

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57. Let $f(x) = \frac{1}{\sqrt{18 - x^2}}$ The value of $Lt_{x \to 3} \frac{f(x) - f(3)}{x - 3}$ is

A. 0

B. $-1/9$

C. $-1/3$

D. $1/9$

Answer: D

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58. If

$f(x) = \frac{2}{x - 3}, g(x) = \frac{x - 3}{x + 4}, and h(x) = -\frac{2(2x + 1)}{x^2 + x - 12}, then(\lim)_{x \to 3}[$

is -2 (b) -1 (c) $-\frac{2}{7}$ (d) 0

A. -2

B. -1

C. $-2/7$

D. 0

Answer: C

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59. The value of $\lim_{x \to 0} \frac{a^x - b^x}{x}$,is

A. $\log(a/b)$

B. $\log(b/a)$

C. $\log(ab)$

D. $-\log(ab)$

Answer: A

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60. The value of $\lim_{x \to 0} \frac{e^x - (x + x)}{x^2}$,is

A. 0

B. $1/2$

C. 2

D. e

Answer: B

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61. $\lim_{x \to 1} (1 + \cos \pi x)\cot^2 \pi x$ is equal to

A. 1

B. -1

C. $1/2$

D. $-1/2$

Answer: C

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62. The value of $\lim_{x \to 0} \frac{\int_0^x t dt}{x \tan(x+\pi)}$ is equal to

A. 0

B. 2

C. $1/2$

D. 1

Answer: C

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63. The value of $\lim_{x \to \infty} \left(\frac{x^2+6}{x^2-6} \right)^x$ is given by

A. 0

B. 1

C. -1

D. none of these

Answer: B

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64. If [x] denotes the greatest integer less than or equal to x,then the value of $\lim_{x \to 1} (1 - x + [x - 1] + [1 - x])$ is

A. 0

B. 1

C. -1

D. none of these

Answer: C

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

A. 0

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

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

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

Answer: C

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66. If $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ Then, $\lim_{x \to 0} f(x)$

A. is equal to 1

B. is equal to -1

C. is equal to 0

D. does not exist

Answer: C

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67. $\lim_{x \to -\pi} \frac{|x+\pi|}{\sin x}$ is

A. is equal to -1

B. is equal to 1

C. is equal to π

D. does not exist

Answer: D

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68. If $\lim_{x \to \infty} \left(\sqrt{x^2 - x + 1} - ax - b\right) = 0$ then the value of a and b are given by:

A. $a = 1, b = \frac{1}{2}$

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

C. $a = -1, b = \frac{1}{2}$

D. none of these

Answer: B

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69. $\lim_{x \to 1} \frac{\sum_{r=1}^{n} x^r - n}{x - 1}$ is equal to

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

B. $\frac{n(n+1)}{2}$

C. 1

D. 0

Answer: B

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70. $\lim_{x \to \frac{\pi}{4}} \frac{2\sqrt{2} - (\cos x + \sin x)^3}{1 - \sin 2x} =$

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

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

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

D. $\sqrt{2}$

Answer: A

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71. The value of $\lim_{n \to \infty} \frac{1. \sum_{r=1}^{n}(r) + 2. \sum_{r=1}^{n-1}(r) + 3\sum_{r=1}^{n-2}(r) + \ldots . + n.1}{n^4}$

A. a.$1/24$

B. b.1//12`

C. c.1//6`

D. d.none of these

Answer: A

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72. The value of $\lim_{x \to \infty} \left\{ \frac{1}{3} + \frac{2}{21} + \frac{3}{91} + \ldots + \frac{n}{n^4 + n^2 + 1} \right\}$, is

A. 1

B. $1/2$

C. $1/3$

D. none of these

Answer: B

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73. The value $\lim_{x \to \pi/2} (\sin x)^{\tan x}$, is

A. 0

B. 1

C. -1

D. ∞

Answer: B

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74. The value of $\lim_{x \to \infty} \frac{5^{x+1} - 7^{x+1}}{5^x - 7^x}$,is

A. 5

B. -5

C. 7

D. -7

Answer: C

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75. The value of $\lim_{x \to 3} \frac{3^x - x^3}{x^x - 3^3}$, is

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

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

C. 1

D. none of these

Answer: A

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76. $\lim_{n \to \infty} \left[\log_{n-1}(n)\log_n(n+1) \cdot \log_{n+1}(n+2) \ldots . \log_{n^k-1}\left(n^k\right)\right]$ is equal to :

A. ∞

B. n

C. k

D. none of these

Answer: C

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77. The value of $\lim_{m \to \infty} \left(\cos\frac{x}{m}\right)^m$ is

A. e

B. e^{-1}

C. 1

D. none of these

Answer: C

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78. The value of $\lim_{x \to \infty} \frac{\sqrt{n^2+1}+\sqrt{n}}{(n^4+n)^{\frac{1}{4}}+4\sqrt{n}}$, is

A. 0

B. 1

C. -1

D. none of these

Answer: B

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79. The value of $\lim_{x \to 0} \frac{x^2 \sin\left(\frac{1}{x}\right)}{\sin x}$, is

A. 1

B. 0

C. $1/2$

D. none of these

Answer: B

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80. If $l = \lim_{x \to -2} \frac{\tan \pi x}{x+2} + \lim_{x \to \infty} \left(\frac{1+1}{(x^2)^2} \right)$, then which one of the following is not correct?

A. $l > 3$

B. $l > 4$

C. $l < 4$

D. l is a transcendental number

Answer: B

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81. The value of $\lim_{n \to \infty} \left(\sqrt{n^2 + n + 1} - \left[\sqrt{n^2 + n + 1} \right] \right)$ where [.] denotes the greatest integer function is

A. 0

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

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

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

Answer: B

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82. $\lim_{x \to \infty} \frac{1^2 . n + 2^2 . (n-1) + 3^2 . (n-2) + \ldots\ldots + n^{2.1}}{1^3 + 2^3 \ldots\ldots + n^3}$, is equal to.

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

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

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

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

Answer: A

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83. $\lim_{x \to \infty} \frac{\cot^{-1}(x^{-a} \log_a x)}{\sec^{-1}(a^x \log_x a)}, (a > 1)$ is equal to

(a) 2

(b) 1

(c) $(\log)_a 2$

(d) 0

A. 1

B. 0

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

D. does not exist

Answer: A

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84. Let $a = \min\{x^2 + 2x + 3 : x \in R\}$ and $b = \lim_{x \to 0} \frac{\sin x \cos x}{e^x - e^{-x}}$. Then the value of $\sum_{r=0}^{n} a^r, b^{n-r}$, is

A. $\frac{2^{n+1} + 1}{3.2^n}$

B. $\frac{2^{n+1} - 1}{3.2^n}$

C. $\frac{2^n - 1}{3.2^n}$

D. $\frac{4^{n+1} - 1}{3.2^n}$

Answer: D

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85. $\lim_{x \to \infty} \frac{\cot^{-1}\left(\sqrt{x+1} + \sqrt{x}\right)}{\sec^{-1}\left\{\left(\frac{2x+1}{x-1}\right)^x\right\}} =$

A. 1

B. 0

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

D. does not exist

Answer: A

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86. Let $f(x) = \lim_{n \to \infty} \frac{2x^{2n} \frac{\sin(1)}{x} + x}{1 + x^{2n}}$, then which of the following alternative(s) is/ are correct?

A. $\lim_{x \to \infty} xf(x) = 2$

B. $\lim_{x \to 1} f(x)$ does not exist

C. $\lim_{x \to 0} f(x)$ does not exist

D. $\lim_{x \to \infty} f(x)$ is euqal to zero

Answer: A::D

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87. Assume that $\lim_{\theta \to -1} f(\theta)$ exists and $\frac{\theta^2+\theta-2}{\theta+3} \leq \frac{f(\theta)}{\theta^2} \leq \frac{\theta^2+2\theta-1}{\theta+3}$ holds for certain interval containing the point $\theta = -1$ then $\lim_{\theta \to -1} f(\theta)$

A. equal to $f(-1)$

B. equal to 1

C. non-existant

D. equal to -1

Answer: A

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88. Let $f(x) = \begin{cases} \frac{\tan^2\{x\}}{x^2-[x]^2} & \text{for} x > 0 \\ \frac{1}{\sqrt{\{x\}\cot\{x\}}} & \text{for} x < 0 \end{cases}$ where $[x]$ is the step up function and $\{x\}$ is the fractional part function of x then

A. $\lim_{x \to +} f(x) = 1$

B. $\lim_{x \to 0^-} f(x) = \cot 1$

C. $\cot^{-1}\left(\lim_{x \to 0^-} f(x)\right)^2 = 1$

D. $\tan^{-1}\left(\lim_{x \to 0^+} f(x)\right) = \frac{\pi}{4}$

Answer: A::B::D

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89. The integer n for which $(\lim)_{x \to 0}\left((\cos x - 1)\frac{\cos x - e\widehat{x}}{x^n}\right.$ is finite nonzero number is _____

A. 1

B. 2

C. 3

D. 4

Answer: C

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90. The value of $\lim_{x \to 0} \left[\frac{x^2}{\sin x \tan x} \right]$ (Wherer $[\cdot]$ denotes greatest integer function) is

A. 0

B. 1

C. limit does not exist

D. -1

Answer: A

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91. $\lim_{x \to 0} \frac{x^a \sin^b x}{\sin(x^c)}$, where $a, b, c \in R$~$\{0\}$, exists and has non-zero value. Then,

A. $a + c = b$

B. $b + c = a$

C. $a + b = c$

D. none of these

Answer: C

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92. $\lim_{x \to 2} \frac{(10 - x)^{1/3} - 2}{x - 2}$ is equal to

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

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

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

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

Answer: B

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93. If $L = \lim_{x \to 0} \frac{a \sin x - bx + cx^2 + x^3}{2x^2 \log(1+x) - 2x^3 + x^4}$ exists and is finie then a=, b=, c= L=

A. $\frac{1}{20}$

B. $\frac{2}{45}$

C. $\frac{3}{40}$

D. $\frac{1}{40}$

Answer: C

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94. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then $\lim_{x \to \alpha} \left(ax^2 + bx + c + 1\right)^{1/x - \alpha}$ is equal to

A. $2a(\alpha - \beta)$

B. $-2\ln|a(\alpha - \beta)|$

C. $e^{a(\alpha - \beta)}$

D. $e^{a^2}|\alpha - \beta|$

Answer: C

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95. Find the integral value of n for which $(\lim)_{x \to 0} \frac{\cos^2 x - \cos x - e^x \cos x + e^x - \frac{x^3}{2}}{x^n}$ is a finite nonzero number

A. 2

B. 3

C. 4

D. 5

Answer: C

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96. The graph of function $y = f(x)$ has a unique tangent at $(e^a, 0)$ through which the graph passes, then $\lim_{x \to e^a} \frac{\log(1 + 7f(x)) - \sin(f(x))}{3f(x)}$ equals

A. 1

B. 2

C. 7

D. -2

Answer: B

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Chapter Test

1. Let $f(x) = \begin{cases} x^2 & x \varepsilon Z \\ \frac{d(x^2 - 4)}{2 - x} & x \notin Z \end{cases}$ the set of integers. Then $\lim_{x \to 2} f(x)$

A. exists only when $k = 1$

B. exists for every real k

C. exists for every real k expect $k = 1$

D. does not exists

Answer: B

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2. If $S_n = \sum_{k=1}^{n} a_k$ and $\lim_{n \to \infty} a_n = a$, then $\lim_{n \to \infty} \frac{S_{n+1} - S_n}{\sqrt{\sum_{k=1}^{n} k}}$ is equal to

A. 0

B. a

C. $\sqrt{2}a$

D. 2a

Answer: A

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3. If $a_1 = 1 and a_{n+1} = \frac{4+3a_n}{3+2a_n}, n \geq 1, and$ if $(\lim)_{n \to \infty} a_n = a,$ then find the value of a.

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. 2

D. none of these

Answer: A

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4. If $x_1 = 3$ and $x_{n+1} = \sqrt{2+x_n}$, $n \geq 1,$ then $\lim_{n \to \infty} x_n$ is

A. -1

B. 2

C. $\sqrt{5}$

D. 3

Answer: B

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5. The value of $\lim_{x \to 0} \frac{\sqrt{1 - \cos x^2}}{1 - \cos x}$ is

A. $1/2$

B. 2

C. $\sqrt{2}$

D. none of these

Answer: C

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6. Evaluate $\lim_{n \to \infty} n \cos\left(\frac{\pi}{4n}\right) \sin\left(\frac{\pi}{4n}\right)$.

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

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

C. 1

D. none of these

Answer: B

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7. Evaluate $(\lim)_{n \to \infty} \left\{ \cos\left(\frac{x}{2}\right) \cos\left(\frac{x}{4}\right) \cos\left(\frac{x}{8}\right) \ldots \cos\left(\frac{x}{2^n}\right) \right\}$

A. 1

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

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

D. none of these

Answer: B

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8. If $f(x)$ is the integral of $\frac{2\sin x - \sin 2x}{x^3}$, where $x \neq 0$, then find $\lim_{x \to 0} f'(x)$.

A. 0

B. 1

C. -1

D. 2

Answer: B

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9. Evaluate: $(\lim)_{x \to 0} x^m (\log x)^n$, $m, n \in N$.

A. 0

B. m/n

C. mn

D. n/m

Answer: A

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10. The value of $\lim_{x \to \infty} \frac{\log x}{x^n}, n > 0$, is

A. 0

B. 1

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

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

Answer: A

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11. $\lim_{x \to a} \frac{\log(x-a)}{\log(e^x - e^a)}$

A. 1

B. -1

C. 0

D. 2

Answer: A

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12. Let $< a_n >$ be a sequence such that $\lim_{x \to \infty} a_n = 0$. Then $\lim_{n \to \infty} \frac{a_1 + a_2 + + a_n}{\sqrt{\sum_{k=1}^{n} k}}$, is

A. a.0

B. b.1

C. $c.\ \sqrt{2}$

D. d.2

Answer: C

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13. If $f(a)=2, f'(a)=1, g(a)=-1, g'(a)=2,$ then the value of $(\lim)_{x \to a} \frac{g(x)f(a)-g(a)f(x)}{x-a}$ is -5 (b) $\frac{1}{5}$ (c) 5 (d) none of these

A. -5

B. $1/5$

C. 5

D. $-1/5$

Answer: C

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14. If $f(9) = 9, f'(9) = 4, then (\lim)_{n \to \infty} \frac{\sqrt{f(x) - 3}}{\sqrt{x - 3}} =$ _____.

A. 4

B. 0

C. c

D. 9

Answer: A

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15. $A_i = \frac{x - a_i}{|x - a_i|}, i = 1, 2, ..., n,$ and $a_1 < a_2 < a_3 < ... < a_n.$

If $1 \leq m \leq n,$ min $N,$ then $\lim_{x \to a_m} (A_1 A_2 ... A_n)$

A. is equal ot $(-1)^m$

B. is equal to $(-1)^m + 1$

C. is equal to $(-1)^m - 1$

D. does not exist.

Answer: D

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16. $\lim_{x \to \infty} \frac{x^n}{e^x} = 0$, (n is an integer) for

A. no vlaue of n

B. all values of n

C. only negative values of n

D. only positive values of n

Answer: B

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17. $\lim_{x \to 0} \frac{x}{\tan^{-1} x}$ is equal to

A. 0

B. $1/2$

C. 1

D. ∞

Answer: B

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18. If $f(x) = x, x < 0$ and $f(x) = 1, x = 0,$ and $f(x) = x^2, x > 0$ then $\lim_{x \to 0} f(x)$ is equal to

A. 0

B. 1

C. 2

D. does not exist.

Answer: D

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19. Evaluate the following limits :

$\lim_{x \to \infty} \sqrt{\left(\frac{x + \sin x}{x - \cos x}\right)}$ is equal to

A. 0

B. 1

C. -1

D. none of these

Answer: B

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20. 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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21. If $f'(2) = 2, f''(2) = 1$, then $\lim_{x \to 2} \frac{2x^2 - 4f'(x)}{x - 2}$, is

A. 4

B. 0

C. 2

D. ∞

Answer: A

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22. $\lim_{x \to 0} \frac{e^{\tan x} - e^{x}}{\tan x - x} =$

A. 1

B. e

C. $e - 1$

D. 0

Answer: A

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23. The value of $\lim_{x \to 2^{-}} \left\{x + (x - [x])^{2}\right\}$, is

A. 0

B. 1

C. 2

D. 3

Answer: D

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24. $\lim_{x \to 0} \left(\frac{e^x + e^{-x} - 2}{x^2} \right)^{1/x^2}$ is equal to

A. a. $e^{\frac{1}{2}}$

B. b. $e^{\frac{1}{4}}$

C. c. $e^{\frac{1}{8}}$

D. d. 0

Answer: D

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25. The value of $\lim_{x \to \infty} \left(\frac{\pi}{2} - \tan^{-1} x \right)^{\frac{1}{x^2}}$, is

A. 0

B. 1

C. -1

D. e

Answer: B

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26. The value of $\lim_{x \to a} \left(\frac{\sin x}{\sin a} \right)^{\frac{1}{x-a}} =$

A. $e^{\sin a}$

B. $e^{\tan a}$

C. $e^{\cot a}$

D. 1

Answer: C

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27. Evaluate the following limit: $\left(\lim\right)_{x \to \infty} \left(\frac{x^2 + 2x + 3}{2x^2 + x + 5}\right)^{\frac{3x-2}{3x+2}}$

A. $e^1/2$

B. $e^3/2$

C. e^3

D. none of these

Answer: D

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28. Evaluate: $(\lim)_{x \overrightarrow{\infty}} \left(\frac{a_1^{\frac{1}{x}} + a_2^{\frac{1}{x}} + - - + a_n^{\frac{1}{x}}}{n}\right)^{nx}$

A. $a_1 + a_2 + \ldots a_n$

B. $e^{a_1 + a_2 + \ldots + a_n}$

C. $\frac{a_1 + a_2 + \ldots + a_n}{n}$

D. $a_1 a_2 \ldots\ldots a_n$

Answer: D

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29. The value of $\lim_{x \to 0} \left(\frac{\sin x}{x} \right)^{\frac{\sin x}{x - \sin x}}$, is

A. e^{-1}

B. e

C. 1

D. none of these

Answer: A

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30. $\lim_{x \to 1} \left[\frac{x^3 + 2x^2 + x + 1}{x^2 + 2x + 3} \right]^{\frac{1 - \cos(x-1)}{(x-1)^2}}$

A. e

B. $e^{1/2}$

C. 1

D. none of these

Answer: D

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31. The value of $\lim_{x \to 0} \frac{\sin x}{xqrt(x^2)}$, is

A. 1

B. -1

C. 0

D. none of these

Answer: D

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32. Let $f: R \to R$ be a differentiable function such that $f(2) = 2$. Then, the value of $\lim_{x \to 2} \int_2^{f(x)} \frac{4t^3}{x-2} dt$, is

A. $6f'(2)$

B. $12f'(2)$

C. $32f'(2)$

D. none of these

Answer: C

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33. Let f''(x) be continuous at x = 0 and f''(0) = 4 then value of $\lim_{x \to 0} \frac{2f(x) - 3f(2x) + f(4x)}{x^2}$

A. 11

B. 2

C. 12

D. none of these

Answer: C

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34. Let $f: R \to R$ be a differentiable function and $f(1) = 4$. Then, the value of $\lim_{x \to 1} \int_4^{f(x)} \frac{2t}{x-1} dt$ is :

A. $8f'(1)$

B. $4f'(1)$

C. $2f'91)$

D. $f'(1)$

Answer: A

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35. Find the values of $aandb$ in order that $(\lim)_{x \to 0} \frac{x(1+a\cos x)-b\sin x}{x^3} = 1[us \in gL'Ho\pi tal'sr\underline{e}].$

A. $\frac{5}{3}, \frac{3}{2}$

B. $\frac{5}{2}, \frac{3}{2}$

C. $-\frac{5}{2}, \frac{3}{2}$

D. none of these

Answer: C

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36. If $\lim_{x \to a} \left(\frac{f(x)}{g(x)}\right)$ exists, then

A. both $\lim_{x \to a} f(x)$ and $\lim_{x \to a} g(x)$ must exist

B. $\lim_{x \to a} f(x)$ need not exist but $\lim_{x \to a} g(x)$ exists

C. neither $\lim_{x \to a} f(x)$ nor $\lim_{x \to a} g(x)$ many exist

D. $\lim_{x \to a} f(x)$ exists but $\lim_{x \to a} g(x)$ need not exist

Answer: A

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37. Let f (2) = 4 f(2) = 4 Then $Lt_{x \to 2} \frac{xf(2) - 2f(x)}{x - 2}$ is

A. 2

B. -2

C. -4

D. 3

Answer: C

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38. $\lim_{x \to 0} \frac{1}{x}\left[\int_{y}^{a}\right) e^{\sin^2 t} dt - \int_{x+y}^{a}\right) e^{\sin^2 t} dt\Big]$ is equal to (a) $e^{\sin^2 y}$ (b) $\sin 2y e^{\sin^2 y}$ (c) 0 (d) none of these

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

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

C. 0

D. none of these

Answer: A

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39. $\lim_{x \to \infty} \frac{\int_0^{2x} x e^{x^2} dx}{e^{4x^2}}$

A. 0

B. ∞

C. 2

D. $1/2$

Answer: D

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40. Evaluate $\lim_{x \to 0} \frac{3x + |x|}{7x - 5|x|}$.

A. 0

B. $1/6$

C. 0

D. does not exist.

Answer: D

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41. Let $\alpha, \beta(a < b)$ be the roots of the equation $ax^2 + bx + c = 0$. If $\lim_{x \to m} \frac{|ax^2 + bx + c|}{ax^2 + bx + c} = 1$ then

A. $a < 0$ and $\alpha < m < \beta$

B. $a > 0$ and $m > 1$

C. a gt0 and m lt 1`

D. all the above

Answer: D

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42. Given that

$$\lim_{n \to \infty} \sum_{r=1}^{n} \frac{\log(r+n) - \log n}{n} = 2\left(\log 2 - \frac{1}{2}\right),$$

$$\lim_{n \to \infty} \left[\frac{1}{n^k}\left[(n+1)^k (n+2)^k \ldots . (n+n)^k\right]\right]^{1/n}, \text{ is}$$

A. $\frac{4k}{e}$

B. $k\sqrt{\frac{4}{e}}$

C. $\left(\frac{4}{e}\right)^k$

D. $\left(\frac{e}{4}\right)^k$.

Answer: C

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43. $(\lim)_{x \to 0}\left(\frac{1^x + 2x + 3^x + + n^x}{n}\right)^{1/x} isequa < o\,(n!)^n$ (b) $(n!)^{\frac{1}{n}}$ (c) $n!$ (d) $\ln(n!)$

A. $(n!)^n$

B. $(n!)^{1/n}$

C. $n!$

D. In $(n!)$

Answer: B

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44. $\lim_{x \to 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$ equal

A. 2

B. -2

C. $1/2$

D. $-1/2$

Answer: C

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45. If $\lim_{x \to \infty} \left\{ ax - \frac{x^2 + 1}{x + 1} \right\} = b$, a finite number, then

A. $a = 1, b = 1$

B. $a = 0, b = 1$

C. $a = -1, b = 1$

D. $b = -1, b = -1$

Answer: A

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46. If $f(1) = g(1) = 2$, then $\lim_{x \to 1} \frac{f(1)g(x) - f(x)g(1) - f(1) + g(1)}{f(x) - g(x)}$ is equal to

A. 0

B. 1

C. 2

D. -2

Answer: D

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47. Let $f(x)$ be a twice-differentiable function and $f''(0) = 2$. Then evaluate $\lim_{x \to 0} \frac{2f(x) - 3f(2x) + f(4x)}{x^2}$.

A. 6

B. 3

C. 12

D. none of these

Answer: A

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48. Evaluate : $(\lim)_{x \to \frac{\pi}{4}} \frac{1 - \cot^3 x}{2 - \cot x - \cot^3 x}$

A. $\frac{11}{4}$

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

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

D. none of these

Answer: B

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49. $\lim_{x \to 0} \frac{1}{x^{12}} \left\{ 1 - \cos\left(\frac{x^2}{2}\right) - \cos\left(\frac{x^4}{4}\right) + \cos\left(\frac{x^2}{2}\right)\cos\left(\frac{x^4}{4}\right) \right\}$ is equal to

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

B. $\frac{1}{256}$

C. $\frac{1}{16}$

D. $-\frac{1}{256}$

Answer: B

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50. The value of $\lim_{x \to \infty} \left(\frac{1+3x}{2+3x} \right)^{\frac{1-\sqrt{x}}{1-x}}$ is

A. 0

B. -1

C. e

D. 1

Answer: D

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51. $\lim_{x \to \infty} \left(\frac{3x^2+2x+1}{x^2+x+2} \right)^{\frac{6x+1}{3x+1}}$, is equal to

A. 3

B. 6

C. 9

D. none of these

Answer: C

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52. The value of $\lim_{x \to 0} \frac{3\sqrt{1+\sin x} - 3\sqrt{1-\sin x}}{x}$, is

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

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

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

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

Answer: A

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53. Evaluate: $(\lim)_{h \to 0} \frac{(a+h)^2 \sin(a+h) - a^2 \sin a}{h}$

A. $2a \sin a + a^2 \cos a$

B. $2a \sin a - a^2 \cos a$

C. $2a \cos a + a^2 \sin a$

D. none of these

Answer: A

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54. $\lim_{h \to 0} \frac{\sin(a+3h) - 3\sin(a+2h) + 3\sin(a+h) - \sin a}{h^3} =$

A. $\sin a$

B. $-\sin a$

C. $\cos a$

D. $-\cos a$

Answer: D

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55. Let $a = \min\{x^2 + 2x + 3, x\varepsilon R\}$ and $b = \lim_{x\theta \to 0} \frac{1 - \cos\theta}{\theta^2 0}$. The value fo $\sum_{r=0}^{n} a^r . b^{n-r}$ is

A. $2n$

B. 3^n

C. 3^{n+1}

D. 2^{n-1}

Answer: B

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

A. $-2/3$

B. 0

C. $-1/3$

D. $2/3$

Answer: D

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57. If $f(x) = \{\sin x, x \neq n\pi, n \in I2, otherwise$

$g(x) = \{x^2 + 1, x \neq 0, 4, x = 05, x = 2$ then $(\lim)_{x \to 0} g\{f(x)\} is =$

A. 1

B. 5

C. 6

D. 7

Answer: A

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58. If $\lim_{x \to 0} \frac{x(1 + a\cos x) - b\sin x}{x} = 1$, then a-b, are

A. `1/2

B. `5/2

C. `-5/2

D. 0

Answer: D

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