MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

LIMITS

1. $\lim\limits_{x \to 0} \dfrac{\sin 2x}{x}$ is equal to

A. 0

B. 44228

C. 44256

D. 2

Answer: D

2. If $f(x) = x \cos x$, then $\lim\limits_{x \to 0} f(x) =$

A. 1

B. 0

C. -1

D. Does not exist

Answer: B

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3. $\underset{x \to 0}{\mathrm{Lt}} \dfrac{1}{1+x} =$

A. 0

B. 1

C. 44228

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

Answer: b

4. $\displaystyle \operatorname*{Lt}_{x \to 0} (1 + ax)^{\frac{1}{x}} =$

A. a) a

B. b) 1/a

C. c) e^a

D. d) 0

Answer: C

5. $\underset{x \to 0}{\mathrm{Lt}} \; kx \cos ecx = \underset{x \to 0}{\mathrm{Lt}} \; x \cos eckx$ then k =

   A. 1

   B. -1

   C. ± 1

   D. 0

Answer: C

6. $\underset{x \to \alpha}{\text{Lt}} \dfrac{x^5 - (\alpha)^5}{x - \alpha} = 80$ then the value of α is

7. $\underset{x \to 0}{\text{Lt}} \ x \dfrac{\sin 1}{x} =$

A. 1

B. α

C. 0

D. None of these

Answer: A

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8. $\underset{x \to 0}{\text{Lt}} \dfrac{\sqrt{x^2 + 1} - 1}{\sqrt{x^2 + 16} - 4} =$

A. a) 3

B. b) 4

C. c) 1

D. d) 2

Answer: B

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9. $\displaystyle\lim_{x \to 0} \dfrac{1 - \cos x}{x^2} = \,?$

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10. $\displaystyle\lim_{x \to 0} \dfrac{e^{2x} - 1}{\sin 3x} = \,?$

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11. $\lim\limits_{x \to \infty} \dfrac{\sin x}{x} = ?$

A. a) 0

B. c) ∞

C. c) 1

D. d) does not exist

Answer: A

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12. $\lim\limits_{x \to 0} \dfrac{\sin x^{\circ}}{x} = ?$

A. 1

B. π

C. x

D. $\dfrac{\pi}{180}$

Answer: D

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13. $\underset{x \to 1}{\mathrm{Lt}} \dfrac{\sin \pi x}{x - 1}$ is equal to

A. a) $-\pi$

B. b) π

C. c) $-\dfrac{1}{\pi}$

D. d) $\dfrac{1}{\pi}$

Answer: A

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14. $\underset{x \to 3}{\text{Lt}} \dfrac{x - 3}{|x - 3|} =$

A. a) 1

B. b) -1

C. c) 0

D. d) Does not exist

Answer: B

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15. $\underset{n \to \infty}{\text{Lim}} \dfrac{1^2 + 2^2 + \dots + n^2}{n^3} =$

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16. $\underset{x \to 0}{\text{Lim}} \dfrac{x}{\tan x} = ?$

17. $\displaystyle \lim_{x \to \infty} a^x \sin\left(\dfrac{b}{a^x}\right), a, b > 1$ is equal to

A. b

B. 1

C. $a \log_e b$

D. $b \log_e a$

Answer: A

18. The value of $\displaystyle\lim_{n \to \infty} n \frac{!}{(n+1)! - n!}$

A. a) 0

B. b) 1

C. c) -1

D. d) 2

Answer: A

19. $\underset{x \to \frac{\pi}{3}}{\text{Lim}} \dfrac{\sin\left(\frac{\pi}{3} - x\right)}{2\cos x - 1}$ is equal to

20. $\underset{x \to 0}{\text{Lim}} \dfrac{e^{-x} - 1}{x}$ is

A. a) 0

B. b) 1

C. c) -1

D. d) None of these

Answer: C

21. The value of $\lim x \to \dfrac{\pi}{2} \left(\dfrac{2x - \pi}{\cos x} \right)$ is

A. a) -1

B. b) -2

C. c) 1

D. d) 2

Answer: B

22. The value of $\lim\limits_{x \to 0} \dfrac{(e^x - 1)\log(1 + x)}{\sin^2 x}$ is equal to

23. The value of $\lim\limits_{x \to 0} \dfrac{\left(1 + x + x^2\right) - e^x}{x^2}$ is equal to

A. 44228

B. 44256

C. 44287

D. None of these

Answer: A

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24. $\lim\limits_{x \to \frac{1}{2}} \dfrac{2x^2 - 3x + 1}{2x - 1} = ?$

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25. $\mathop{\mathrm{Lt}}\limits_{x \to 0} \dfrac{1 - \cos 4x}{x^2} =$

A. a) 8

B. b) 4

C. c) 16

D. d) None of these

Answer: A

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26. If $\underset{x \to 0}{\text{Lt}} \dfrac{\log(3 + x) - \log(3 - x)}{x} = k$, then k =

A. 44256

B. 44382

C. 2/3

D. -1/3

Answer: C

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27. $\displaystyle \operatorname*{Lt}_{x \to 0} \frac{xe^x - \log(1 + x)}{x^2} =$

A. 44230

B. 44257

C. 44256

D. None of these

Answer: A

28. $\lim_{n \to \infty} \dfrac{5^n + 3^n}{5^n - 3^n} =$

A. 1

B. 2

C. 44228

D. 44256

Answer: A

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29. Find the value of $\lim_{x \to 0} (1 + 5x)^{\frac{x+2}{x}}$ is

A. e^5

B. e^{10}

C. 10

D. None of these

Answer: B

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30. $\displaystyle \operatorname*{Lt}_{x \to 4} \frac{\sqrt{x} - 2}{x - 4}$ =?

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31. $\displaystyle \operatorname*{Lt}_{h \to 0} \frac{\sqrt[3]{h + 1} - 1}{h}$ =?

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32. $\underset{x \to 0}{\text{Lt}} \dfrac{\sin x^{\circ}}{x}$

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33. $\underset{x \to 0}{\text{Lt}} \dfrac{\tan ax}{\sin bx}$

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34. $\underset{x \to 0}{\text{Lt}} \dfrac{e^{2x} + \sin x - 1}{x}$ ﹑

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35. $\displaystyle \operatorname*{Lt}_{x \to \infty} \frac{(2x-1)^{20} \cdot (8x-1)^{30}}{(4x+2)^{50}}$

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36. $\displaystyle \operatorname*{Lt}_{x \to 1} \frac{1 - x^{\frac{1}{3}}}{1 - x^{\frac{2}{3}}}$

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37. $\displaystyle \operatorname*{Lt}_{x \to a} \frac{1 - \cos(x-a)}{(x-a)^2}$

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38. $\lim\limits_{x \to 0} \dfrac{e^{13x} - e^{7x}}{x}$

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39. $\lim\limits_{x \to 0} \dfrac{\tan^{-1} x}{x}$

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40. $\lim\limits_{x \to 1} \dfrac{x^4 + 4x^3 - 5x^2}{x - 1}$

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41. $\displaystyle \operatorname*{lt}_{x \to 0} \frac{\sin x(1 - \cos x)}{x^3}$

42. $\displaystyle \lim_{x \to 0} \frac{\cos 5x - \cos 7x}{\cos x - \cos 5x}$

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

44. Prove that

$$\lim_{x \to 0} \frac{\sqrt{a+x} - \sqrt{a}}{x} = \frac{1}{2\sqrt{a}} (a \neq o)$$

45. Prove to $\lim_{x \to e} \dfrac{\log_e x - 1}{x - e} = \dfrac{1}{e}$

46. $\lim\limits_{x \to 1} \left(\dfrac{x^2 - 3x + 2}{x^3 - 4x + 3} \right)$

47. $\lim\limits_{x \to 3} \dfrac{x - 3}{\left(\sqrt{x - 2} - \sqrt{4 - x} \right)}$

48. $\lim\limits_{x \to 0} \dfrac{e^{x^2} - 1}{\sin^2 x}$

49. Find the value $\lim\limits_{x \to 0} \dfrac{e^{\sin x} - 1}{\log_e(1 + x)}$

50. Prove that $\lim\limits_{x \to 0} \dfrac{\sin x}{\log_e(1 + x)^{\frac{1}{2}}} = 2$

51. Evaluate : $\underset{x \to e}{\text{Lt}} \dfrac{\log x - 1}{x - e}$

52. $\underset{x \to -a}{\text{Lt}} \dfrac{x^9 + a^9}{x + a} = 9$, then find the value of a.

53. If f is odd function and if $\underset{x \to 0}{\text{Lim}} \ f(x)$ exist.

Prove that this limit must be zero.

54. Find the value of $\underset{x \to 1}{\lim} \ (\log_3 3x)^{\log_x 3}$

55. Find $\displaystyle \lim_{x \to 1^+} \left(\frac{1}{x-1} \right) = ?$

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56. Show that $\displaystyle \lim_{x \to 0} e^{-\frac{1}{x}}$ does not exits.

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57. $\displaystyle \lim_{x \to 0} \frac{\sqrt{\cos x} - \sqrt[3]{\cos x}}{\sin x}$

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58. Find the value of

$$\lim_{x \to \frac{\pi}{4}} \frac{4\sqrt{2} - (\cos x + \sin x)^5}{1 - \sin 2x}$$

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59. Evaluate : $\displaystyle\lim_{x \to 0} \frac{x \tan 2x - 2x \tan x}{(1 - \cos 2x)^2}$

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60. Evaluate : $\displaystyle\lim_{x \to 0} \left\{ \tan\left(\frac{\pi}{4} + x\right) \right\}^{\frac{1}{x}}$

61. $\displaystyle\lim_{x \to 2} \dfrac{x - \sqrt{3x - 2}}{x^2 - 4}$

62. Evaluate : $\displaystyle\lim_{x \to 0} \dfrac{27^x - 9^x - 3^x + 1}{\sqrt{2} - \sqrt{1 + \cos x}}$

63. $\displaystyle\lim_{x \to \infty} \left(\sqrt{x^2 + ax + a^2} - \sqrt{x^2 + a^2}\right)$

64. $\lim\limits_{x \to 1} (1 - x)\tan\left(\dfrac{\pi x}{2}\right)$

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65. Evaluate : $\lim\limits_{x \to 0} \dfrac{\tan 2x - \sin 2x}{x^3}$

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66. $\lim\limits_{x \to 0} \dfrac{(1 + x)^{\frac{3}{4}} - (1 - x)^{\frac{3}{4}}}{x}$

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67. $\lim\limits_{x \to 3} \dfrac{\sqrt{x-3} + \sqrt{x} - \sqrt{3}}{\sqrt{x^2 - 9}}$

68. $\lim\limits_{x \to 2} \dfrac{x^2 - 4}{\sqrt{3x - 2} - \sqrt{x + 2}}$

69. $\lim\limits_{x \to 0} \left(\sqrt{a^2 + x^2} - \dfrac{\sqrt{a^2 - x^2}}{x^2} \right.$

70. *Evaluate* : lim_(x to 0)((1-x)^n-1)/x`

71. If $G(x) = -\sqrt{25 - x^2}$ then

$$\lim_{x \to 1} \frac{G(x) - G(1)}{x - 1} = ?$$

72. Evaluate : $\lim\limits_{x \to 0} \dfrac{e^x - 1}{\sqrt{1 - \cos x}}$ (if exists).

73. Show that : $\lim\limits_{x \to 3} \dfrac{1}{2 + e^{\frac{1}{x-3}}} (2 < e < 3)$

does not exists.

74. Evaluate $\lim\limits_{x \to 1} \dfrac{a^{x-1} - 1}{\sin \pi x} = 1$

75. Evaluate : $\displaystyle\lim_{x \to 0} \left(\dfrac{1 + 5x^2}{1 + 3x^2} \right)^{\frac{1}{x^2}}$

76. If $f(x) = mx^2 + n, \; x < o$

$= nx + m, \; o \le x \le 1$

$= nx^3 + m, \; x > 1$

For what value of integers m,n does the limits

$\displaystyle\lim_{x \to 0} f(x)$ and $\displaystyle\lim_{x \to 1} f(x)$ exist.

77. If $f(x) = |x| + 1, x < 0$

$=0, x = 0$

$= |x| - 1, x > 0$

For what value(s) of a does $\lim\limits_{x \to a} f(x)$ exist?

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78. $\operatorname*{Lt}_{x \to 4} \dfrac{x^{\frac{7}{2}} - 4^{\frac{7}{2}}}{x - 4} =?$

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79. Evaluate : $\lim\limits_{x \to 0} \dfrac{\tan x - \sin x}{x^3}$

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80. Evaluate : $\lim\limits_{x \to \left(\frac{\pi}{2}\right)} (\cos x + 1)^{\tan x}$

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81. Evaluate : $\lim\limits_{x \to 0} (\sin x + 1)^{\cot x}$

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82. Evaluate : $\displaystyle\lim_{x \to 0} \frac{1 - \cos x \sqrt{\cos^2 x}}{x^2}$

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83. Find : $\displaystyle\lim_{x \to 0} \frac{x}{\cot x}$

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84. If $\displaystyle\lim_{x \to a} f(x) = \lim_{x \to a} \phi(x)$ then always $f(x) = \phi(x)$. Is it true for all cases. Explain.

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85. Find $\displaystyle\lim_{\theta \to 0} \theta \log\left(2 - \cos^2 \theta\right)$

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86. If $\displaystyle Lt_{x \to 0} \frac{x^2 - b}{ax - 3} = 2$ find the value of b.

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87. Evaluate :

$\displaystyle Lt_{x \to \infty} \frac{(x+1)^{10} + (x+2)^{10} + \ldots + (x+100)^{10}}{x^{10}}$

88. Let $f(x) = \dfrac{bx + a}{x + 1}$, $\displaystyle\lim_{x \to 0} f(x) = 2$ then the value of a is .