LIMITS AND CONTINUITY

SYNOPSIS

- **DEFINITIONS :**

  • If f: A→B, A and B are sub-sets of R, then f is called a real function.

  • The function f: $R^+ \to R$; f(x)=log x (or ln x) is called the natural logarithmic function.

  • f: $R \to R^+$, f(x)= e^x, is called the exponential function.

  • f: R→R, f(x)= [x] (the greatest integer not exceeding x),is called the greatest integer function.

- **NEIGHBOURHOOD:**

  Let a and δ be two real numbers, then (a-δ,a+δ) is called δ- neighbourhood of a. The interval (a-δ,a) is called the left δ- neighbourhood of 'a' and the interval (a,a+δ) is called the right δ- neighbourhood of a. The deleted δ neighbourhood of 'a' is denoted by (a-δ,a) ∪ (a,a+δ)

- **LIMIT OF A FUNCTION:**

  Let f be a function defined in a deleted neighbourhood of a. For every positive real number ∈,there exists another positive real number δ, such that | f(x)- l |<∈ whenever 0< |x-a | < δ. Then the function f(x) is said to be tending to the limit l as x tends to a and it is denoted by $\underset{x\to a}{Lim} f(x) = l$

- **RIGHT AND LEFT LIMITS:**

  Let f be defined in a right neighbourhood of a and ' l ' be any real number, if For every ∈>0, there exists δ>0 such that a< x<a+ δ ⇒|f (x)- l | < ∈, then the function f(x) tends to l as x tends to 'a' from right hand side and is denoted by $\underset{x\to a^+}{Lim} f(x) = l$

  Similarlym if for every ∈>0, there exists δ>0 such that a-δ< x < a ⇒| f(x)- l | <∈, then f(x) tends to l as x tends to 'a' from left hand side and is denoted by $\underset{x\to a^-}{Lim} f(x) = l$

  If the right and left limits of a function are equal, then the function is an existing limit function. If $\underset{x\to a^+}{Lim} f(x) = \underset{x\to a^-}{Lim} f(x)$, then $\underset{x\to a}{Lim} f(x)$ exists.

- **INFINITE LIMITS:** Let f be a function defined in a deleted neighbourhood of 'a', if For every ε>0.there exists a δ>0 such that 0< | x-a |< δ ⇒ f(x) >ε, then the function f(x)tends to +∞ as x tends to 'a' and is written as $\underset{x\to a}{Lim} f(x) = \infty$

  Similarly we define $\underset{x\to a}{Lim} f(x) = -\infty$

- **PROPERTIES OF LIMITS :**

  - $\underset{x\to a}{Lim}\left[f(x) \pm g(x)\right] = \underset{x\to a}{Lim} f(x) \pm \underset{x\to a}{Lim} g(x)$
  - $\underset{x\to a}{Lim} f(x).g(x) = \underset{x\to a}{Lim} f(x).\underset{x\to a}{Lim} g(x)$
  - $\underset{x\to a}{Lim}\frac{f(x)}{g(x)} = \frac{\underset{x\to a}{Lim} f(x)}{\underset{x\to a}{Lim} g(x)}$ where $\underset{x\to a}{Lim} g(x) \neq 0$
  - $\underset{x\to a}{Lim}\left(C.f(x)\right) = C.\underset{x\to a}{Lim} f(x)$
  - $\underset{x\to a}{Lim}\left[k \pm f(x)\right] = k \pm \underset{x\to a}{Lim} f(x)$
  - $\underset{x\to a}{Lim}\left[f(x)\right]^n = \left[\underset{x\to a}{Lim} f(x)\right]^n$
  - $\underset{x\to a}{Lim}\left|f(x)\right| = \left|\underset{x\to a}{Lim} f(x)\right|$
  - $\underset{x\to a}{Lim} f\left[g(x)\right] = f\left[\underset{x\to a}{Lim} g(x)\right]$
  - $\underset{x\to a}{Lim}\left[f(x)\right]^{g(x)} = \left[\underset{x\to a}{Lim} f(x)\right]^{\underset{x\to a}{Lim} g(x)}$

- **STANDARD FORMULAE**

  • For all real values of n, $\underset{x\to a}{Lim}\frac{x^n - a^n}{x-a} = n.a^{n-1}$

  • If $0<|x|<\frac{\pi}{2}$ and x is measured in radians.

  $$\underset{x\to 0}{Lim}\frac{\sin x}{x} = 1 \text{ and } \underset{x\to 0}{Lim}\frac{\tan x}{x} = 1$$

  • If x is measured in degrees

  $$\underset{x\to 0}{Lim}\frac{\sin x^0}{x^0} = 1 \text{ and } \underset{x\to 0}{Lim}\frac{\tan x^0}{x^0} = 1$$

  • $\underset{x\to \infty}{Lim}\frac{\sin x}{x} = 0$ and $\underset{x\to \infty}{Lim}\frac{\cos x}{x} = 0$

  • $\underset{x\to 0}{Lim}\frac{Sin^{-1} x}{x} = 1$ and $\underset{x\to 0}{Lim}\frac{Tan^{-1} x}{x} = 1$

- $\underset{x\to 0}{Lim}\frac{\sinh x}{x}=1$ and $\underset{x\to 0}{Lim}\frac{\tanh x}{x}=1$
- $\underset{x\to 0}{\text{Lim}}\frac{\sinh^{-1}x}{x}=1$ and $\underset{x\to 0}{\text{Lim}}\frac{\tanh^{-1}x}{x}=1$
- $\underset{x\to 0}{Lim}(1+x)^{\frac{1}{x}}=e$
- $\underset{x\to \infty}{Lim}\left(1+\frac{1}{x}\right)^{x}=e$
- $\underset{x\to 0}{Lim}\left(\frac{e^x-1}{x}\right)=1$
- $\underset{x\to 0}{Lim}\left(\frac{a^x-1}{x}\right)=\log_e a\,(a>0)$
- $\underset{x\to 0}{\text{Lim}}\frac{a^x-b^x}{x}=\log_e\left(\frac{a}{b}\right)$
- $\underset{x\to 0}{\text{Lim}}\frac{a^x-1}{b^x-1}=\log_b a$

- **INDETERMINATE FORMS**

The values of $\frac{0}{0},\frac{\infty}{\infty},\infty-\infty,\ 0\times\infty,0^0,\infty^0,1^{\infty},0^{\infty}$ etc. are indeterminate forms

- **L'HOSPITAL'S RULE**

If $\underset{x\to a}{\text{Lim}}\frac{f(x)}{g(x)}=$ indeteminate then

$$\underset{x\to a}{\text{Lim}}\frac{f(x)}{g(x)}=\underset{x\to a}{\text{Lim}}\frac{f^1(x)}{g^1(x)}.$$

If $\underset{x\to a}{\text{Lim}}\frac{f^1(x)}{g^1(x)}=$ indeterminate then

$$\underset{x\to a}{\text{Lim}}\frac{f(x)}{g(x)}=\underset{x\to a}{\text{Lim}}\frac{f^{11}(x)}{g^{11}(x)}$$

If $\underset{x\to a}{\text{Lim}}\frac{f^{11}(x)}{g^{11}(x)}=$ indeterminate, then proceed as above till a finite limit is obtained.

- **CONTINUITY OF A FUNCTION:**

- A function f(x) is said to be continuous at x= a if $\underset{x\to a}{Lim}f(x)=f(a)$
- If $\underset{x\to a}{Lim}f(x)\neq f(a)$ then f(x) is discontinuous function at x= a.
- If $\underset{x\to a^+}{Lim}f(x)=f(a)$ then f(x) is right continuous function at x= a.
- If $\underset{x\to a^-}{Lim}f(x)=f(a)$ then f(x) is left continuous function at x= a.
- If f is continuous at x =a and g is continuous at f(a),then gof is continuous at x=a.
- Every constant function is continuous on R.
- The identity function is continuous on R.
- Every polynomial function is continuous on R.
- The functions Sinx, Cosx are continuous on R.
- The functions tan x and sec x are continuous on $R-\left\{(2n+1).\frac{\pi}{2}\right\}$ where n is any integer
- The functions cotx and cosecx are continuous on R-{nπ} where n is any integer
- The function f(x)=|x| is continuous on R.
- The functions $f(x)=e^x$ and $f(x)=a^x(a>o)$ are continuous on R.
- The function f(x)=[x] is continuous at all non integral values and discontinuous at all integral values.

- **IMPORTANT FORMULAE:**

- Let $S=\{x,\sin x,\tan x,\sinh x,\tanh x,\sin^{-1}x,$ $\tan^{-1}x,\sinh^{-1}x,\tanh^{-1}x\}$

If $f(x),g(x)\in S$ then $\underset{x\to 0}{Lt}\frac{f(mx)}{g(nx)}=\frac{m}{n}.$

Ex : $\underset{x\to o}{Lt}\frac{\sin ax}{\tan bx}=\frac{a}{b}$

- If $f_1(x),f_2(x),g_1(x),g_2(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{f_1(mx)\pm f_2(nx)}{g_1(px)\pm g_2(qx)}=\frac{m\pm n}{p\pm q}$$

Ex : $\underset{x\to 0}{Lt}\frac{\sin 7x+\sin 5x}{\tan 5x-\tan 2x}=\frac{7+5}{5-2}=4$

- If $f_1(x),f_2(x),g_1(x),g_2(x)\in S$ and $m+n=p+q$ then $\underset{x\to 0}{Lt}\frac{f_1^{\,m}(ax)f_2^{\,n}(bx)}{g_1^{\,p}(cx)g_2^{\,q}(dx)}=\frac{a^m b^n}{c^p d^q}$

Ex : $\underset{x\to 0}{Lt}\frac{\sin^3 2x\tan^2 3x}{x\sin^4 4x}=\frac{2^3\times 3^2}{4^4}=\frac{9}{32}$

- If $g_1(x),g_2(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{1-\cos ax}{g_1(cx)g_2(dx)}=\frac{a^2}{2cd}$$

Ex : $\underset{x\to 0}{Lt}\frac{1-\cos x}{x\sin 3x}=\frac{1}{6}$

- If $g_1(x),g_2(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{1-\cos^n(ax)}{g_1(cx)g_2(dx)}=\frac{na^2}{2cd}$$

Ex : $\underset{x\to 0}{Lt}\frac{1-\cos^3 2x}{\sin 5x\tan 7x}=\frac{3\times 2^2}{2\times 5\times 7}=\frac{6}{35}$

- If $g_1(x),g_2(x),\ldots\ldots\ldots\ldots g_{2n}(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{1-\cos(ax^n)}{g_1(c_1x)g_2(c_2x)\ldots\ldots g_{2n}(c_{2n}x)}=\frac{a^2}{2c_1c_2\ldots\ldots c_{2n}}$$

$$\underset{x\to 0}{Lt}\frac{1-\cos(2x^3)}{x\sin^2(2x)\tan^3(3x)}=\frac{4}{2\times 2^2\times 3^3}=\frac{1}{54}$$

- If $g_1(x),g_2(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{\cos ax-\cos bx}{f(cx)g(dx)}=\frac{b^2-a^2}{2cd}$$

Ex : $\underset{x\to 0}{Lt}\frac{\cos 3x-\cos 5x}{x^2}=\frac{25-9}{2}=8$

- If $g_1(x),g_2(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{\cos^n ax-\cos^n bx}{g_1(cx)g_2(dx)}=\frac{n(b^2-a^2)}{2cd}$$

Ex : $\underset{x\to 0}{Lt}\frac{\cos^3 3x-\cos^3 5x}{x^2}=\frac{3(25-9)}{2}=24$

- If $g_1(x),g_2(x),\ldots\ldots\ldots\ldots,g_{2n}(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{\cos(ax^n)-\cos(bx^n)}{g_1(c_1x)g_2(c_2x)\ldots\ldots g_{2n}(c_{2n}x)}=\frac{b^2-a^2}{2c_1c_2\ldots\ldots c_{2n}}$$

$$\underset{x\to 0}{Lt}\frac{\cos(2x^3)-\cos(5x^3)}{x\sin^2(2x)\tan^3(3x)}=\frac{25-4}{2\times 2^2\times 3^3}=\frac{7}{18}$$

- If $g_1(x)\in S$ then

$$\underset{x\to 0}{Lt}\frac{\tan^n(ax)-\sin^n(ax)}{[g(x)]^{n+2}}=\frac{na^{n+2}}{2}$$

Ex : $\underset{x\to 0}{Lt}\frac{\tan x-\sin x}{x^3}=\frac{1}{2}$

- $\underset{x\to 0}{Lt}\frac{\sqrt{1+x^n}-\sqrt{1-x^n}}{x^n}=1$

Ex : $\underset{x\to 0}{Lt}\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{x^2}=1$

- $\underset{x\to 0}{Lt}\frac{\sqrt[n]{a+x^m}-\sqrt[n]{a-x^m}}{x^m}=\frac{2}{n}a^{\frac{1}{n}-1}$

Ex : $\underset{x\to 0}{Lt}\frac{\sqrt{a+x}-\sqrt{a-x}}{x}=a^{\frac{1}{2}-1}=\frac{1}{\sqrt{a}}$

- If $g(x)\in S$ then $\underset{x\to 0}{Lt}\frac{\sqrt{a+x}-\sqrt{a-x}}{g(x)}=\frac{1}{\sqrt{a}}$

Ex : $\underset{x\to 0}{Lt}\frac{\sqrt{3+x}-\sqrt{3-x}}{\sin x}=\frac{1}{\sqrt{3}}$

- If $g(x)\in S$ then $\underset{x\to 0}{Lt}\frac{\sqrt{a+x}-\sqrt{a}}{g(x)}=\frac{1}{2\sqrt{a}}$

Ex : $\underset{x\to 0}{Lt}\frac{\sqrt{2+x}-\sqrt{2}}{x}=\frac{1}{2\sqrt{2}}$

- $\underset{x\to 0}{Lt}\frac{x.a^{\alpha x}-x}{1-\cos(mx)}=\frac{2\alpha}{m^2}\log a$

Ex : $\underset{x\to 0}{Lt}\frac{x.2^{3x}-x}{1-\cos(3x)}=\frac{2\times 3}{3^2}\log 2=\frac{2}{3}\log 2$

- $\underset{x\to 0}{Lt}(1+ax)^{\frac{1}{x}}=e^a$

Ex : $\underset{x\to 0}{Lt}(1+2x)^{\frac{1}{x}}=e^2$

- $\underset{x\to\infty}{Lt}\left(1+\frac{a}{x}\right)^x=e^a$

Ex : $\underset{x\to\infty}{Lt}\left(1+\frac{2}{x}\right)^x=e^2$

- $\underset{x\to\infty}{Lt}\dfrac{a^{x+\alpha}+b}{a^{x+\beta}+c}=a^{\alpha-\beta}$

Ex : $\underset{x\to\infty}{Lt}\dfrac{2^{x+7}+13}{2^{x+5}+10}=2^{7-5}=4$

- $\underset{x\to\infty}{Lt}\left\{\sqrt{x^2+ax+b}-x\right\}=\dfrac{a}{2}$

Ex : $\underset{x\to\infty}{Lt}\left\{\sqrt{x^2-2x+5}-x\right\}=\dfrac{-2}{2}=-1$

LEVEL-I

1. $\underset{x\to a}{Lim}\dfrac{x^{\frac{5}{8}}-a^{\frac{5}{8}}}{x^{\frac{1}{3}}-a^{\frac{1}{3}}}=$

1) $\dfrac{15}{8}a^{\frac{7}{24}}$ 2) $\dfrac{15}{4}a^{\frac{7}{24}}$

3) $-\dfrac{15}{8}a^{\frac{7}{24}}$ 4) $\dfrac{15}{4}a^{-\frac{7}{24}}$

2. $\underset{x\to 2}{Lim}\dfrac{x^5-32}{x^3-8}=$

1) $\dfrac{3}{20}$ 2) $\dfrac{20}{3}$ 3) $\dfrac{10}{3}$ 4) $\dfrac{3}{10}$

3. $\underset{x\to 1}{Lim}\dfrac{x^{-\frac{2}{3}}-1}{x^{-\frac{3}{4}}-1}=$

1) $\dfrac{5}{9}$ 2) $\dfrac{9}{5}$ 3) $\dfrac{8}{9}$ 4) 0

4. $\underset{x\to a}{Lim}\dfrac{x^p-a^p}{x^q-a^q}=$

1) $\dfrac{p}{q}a^{p-q}$ 2) $pq\,a^{p-q}$ 3) $\dfrac{q}{p}a^{q-p}$ 4) a^{q-p}

5. $\underset{x\to 2}{Lim}\dfrac{7x^2-11x-6}{3x^2-x-10}=$

1) $\dfrac{17}{11}$ 2) $\dfrac{11}{17}$ 3) $\dfrac{17}{14}$ 4) $-\dfrac{17}{11}$

6. $\underset{x\to 3}{Lim}\dfrac{2x^2-5x-3}{x^2-4x+3}=$

1) 7 2) 14 3) $\dfrac{2}{7}$ 4) $\dfrac{7}{2}$

7. $\underset{x\to 3}{Lim}\dfrac{x^3-6x-9}{x^4-81}=$

1) $\dfrac{7}{36}$ 2) $\dfrac{36}{7}$ 3) $\dfrac{1}{36}$ 4) $-\dfrac{1}{36}$

8. $\underset{x\to 1}{Lim}\dfrac{(2x-3)(\sqrt{x}-1)}{2x^2+x-3}=$

1) $\dfrac{1}{10}$ 2) $-\dfrac{1}{10}$ 3) $\dfrac{2}{5}$ 4) $-\dfrac{2}{5}$

9. $\underset{x\to 0}{Lim}\dfrac{a^x-b^x}{x}=$

1) $\log\left(\dfrac{a}{b}\right)$ 2) $\log\left(\dfrac{b}{a}\right)$ 3) $\log(ab)$ 4) $\log_b{}^a$

10. $\underset{x\to\sqrt{3}}{Lim}\dfrac{x^2-3}{x^4+x^2+1}=$

1) 0 2) -1 3) 1 4) 2

11. $\underset{x\to\frac{1}{2}}{Lim}\dfrac{8x^3-1}{6x^2-5x+1}=$

1) 6 2) 3 3) $\dfrac{1}{3}$ 4) $\dfrac{1}{6}$

12. $\underset{x\to 1}{Lim}\dfrac{x^2-\sqrt{x}}{\sqrt{x}-1}=$

1) 1 2) 2 3) 3 4) 4

13. $\underset{x\to 0}{Lim}\dfrac{\log(1+ax)-\log(1+bx)}{x}=$

1) $a+b$ 2) $a-b$ 3) $-(a+b)$ 4) ab

14. $\underset{x\to 0}{Lim}\dfrac{e^x+\sin x-1}{\log(1+x)}=$

1) 1 2) $\dfrac{1}{3}$ 3) $\dfrac{2}{3}$ 4) 2

15. $\underset{x\to e}{Lim}\dfrac{\log x-1}{x-e}=$

1) 1 2) $\dfrac{1}{e}$ 3) e^2 4) e

16. $\underset{x\to 0}{Lim}\dfrac{e^{2x}-1}{3x}=$

1) $\dfrac{2}{3}$ 2) 6 3) $\dfrac{3}{2}$ 4) $\dfrac{1}{6}$

17. $\underset{x\to 0}{Lim}\frac{a^x-1}{b^x-1}=$

1) $\log_b^{\ a}$ 2) $\log_a^{\ b}$ 3) $\log_c^{\ ab}$ 4) $\log_e^{\left(\frac{a}{b}\right)}$

18. $\underset{x\to 0}{Lim}\frac{e^x-1}{\sqrt{1+x}-1}=$

1) 1 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) 2

19. $\underset{x\to a}{Lim}\frac{\log x-\log a}{\tan(x-a)}=$

1) $\frac{1}{a}$ 2) a 3) 0 4) $\frac{2}{a}$

20. $\underset{x\to 0}{Lim}\frac{5^x-2^x}{\sin x}=$

1) $\log\left(\frac{5}{2}\right)$ 2) $\log\left(\frac{2}{5}\right)$

3) $\log 10$ 4) $\log 2$

21. $\underset{x\to\frac{1}{2}}{Lim}\left(\frac{8x-3}{2x-1}-\frac{4x^2+1}{4x^2-1}\right)=$

1) $\frac{7}{2}$ 2) $\frac{7}{3}$ 3) $\frac{5}{3}$ 4) $\frac{3}{5}$

22. $\underset{x\to 0}{Lim}\frac{e^x-e^{-x}-2x}{x-\sin x}=$

1) 2 2) 3 3) 4 4) 5

23. If $f(x)=x^2+x+1$, then $\underset{x\to 1}{Lim}\frac{f(x)-f(1)}{x-1}=$

1) 3 2) 0 3) -1 4) 2

24. $f(x)=x^2-3x+5$, then $\underset{x\to 2}{Lim}\frac{f(x)-f(2)}{x-2}=$

1) 0 2) 1 3) $\frac{1}{2}$ 4) 4

25. $\underset{x\to 0}{Lim}\frac{\sqrt[K]{1+x}-1}{x}$ (K is a positive integer)

1) K 2) $-K$ 3) $\frac{1}{K}$ 4) $-\frac{1}{K}$

26. If $f(9)=9,\ f^1(9)=4,\ \underset{x\to 9}{Lim}\frac{\sqrt{f(x)}-3}{\sqrt{x}-3}=$

1) 4 2) $\frac{1}{4}$ 3) $\frac{1}{2}$ 4) $-\frac{1}{2}$

27. If $f(a)=2, f^1(a)=1, g(a)=-1, g^1(a)=2$, then

$\underset{x\to a}{Lim}\frac{g(x)f(a)-g(a)f(x)}{x-a}=$

1) $\frac{1}{5}$ 2) 5 3) $-\frac{1}{5}$ 4) -5

28 $\underset{x\to\frac{1}{\sqrt{2}}}{Lim}\frac{x-\cos(\sin^{-1}x)}{1-Tan(\sin^{-1}x)}=$

1) $\frac{1}{\sqrt{2}}$ 2) $-\frac{1}{\sqrt{2}}$ 3) 0 4) 1

29. $\underset{x\to 0}{Lim}\frac{7^{3x}-5^{4x}}{x}=$

1) $\log\left(\frac{125}{343}\right)$ 2) $\log\left(\frac{243}{125}\right)$

3) $\log\left(\frac{343}{625}\right)$ 4) $\log\left(\frac{625}{343}\right)$

30 $f(x)=\begin{cases}x & If\ \ x\le 2\\ x+5 & If\ \ 2<x\le 3\\ x-7 & If\ \ x>3\end{cases}$ $\underset{x\to 3+}{Lim}f(x)=$

1) -2 2) -4 3) 0 4) 4

31. $\underset{h\to 0}{Lim}\frac{(2+h)\cos(2+h)-2\cos 2}{h}=$

1) $\cos 2-2\sin 2$ 2) $\cos 2+2\sin 2$

3) $\sin 2-2\cos 2$ 4) $\sin 2+2\cos 2$

32. $\underset{h\to 0}{Lim}\frac{(a+h)^2\sin(a+h)-a^2\sin a}{h}=$

1) $a^2\cos a-2a\cos a$ 2) $a^2\cos a+2a\sin a$

3) $a^2\sin a$ 4) $a\cos a-\sin a$

33. If $\underset{x\to 0}{Lim}\frac{\log(3+x)-\log(3-x)}{x}=K$, then the value of $K=$

1) $-\frac{2}{3}$ 2) 0 3) $-\frac{1}{3}$ 4) $\frac{2}{3}$

34. If $7-\frac{x^2}{12} \le f(x) \le 7+\frac{x^3}{5}$ for all $x \ne 0$, then $\underset{x \to 0}{Lim} f(x) =$

1) 3 2) 5 3) 7 4) 9

35. If $\underset{x \to 2}{Lim} \frac{x^{n+1}-2^{n+1}}{x-2} = 192$ and $n \in N$, then $n =$

1) 4 2) 5 3) 3 4) 2

36. $\underset{x \to 1}{Lim} \frac{\left(\sum_{K=1}^{200} x^K\right) - 200}{x-1} =$

1) 5050 2) 21000 3) 2010 4) 20100

37. $\underset{x \to 0}{Lim} \frac{(1+x)^2-(1-x)^2}{(1+x)^3-(1-x)^3} =$

1) 1 2) $\frac{1}{2}$ 3) $\frac{2}{3}$ 4) $\frac{3}{2}$

38. $\underset{x \to 0}{Lim} \frac{\sqrt[3]{8+x}-2}{x} =$

1) $\frac{1}{10}$ 2) $\frac{1}{11}$ 3) $\frac{1}{12}$ 4) $\frac{1}{9}$

39. $\underset{x \to 0}{Lim} \frac{\sqrt[3]{1+x}-\sqrt[3]{1-x}}{x} =$

1) $\frac{1}{3}$ 2) $\frac{2}{3}$ 3) 0 4) 1

40. $\underset{x \to 0}{Lim} \frac{\sqrt{1+x+x^2}-1}{x} =$

1) 1 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) 0

41. $\underset{x \to 0}{Lim} \frac{x}{\sqrt{4-x}-\sqrt{4+x}} =$

1) -2 2) $\frac{1}{2}$ 3) 2 4) 0

42. $\underset{x \to -1}{Lim} \frac{x+1}{\sqrt{x^2+3}-2} =$

1) -2 2) $\frac{1}{2}$ 3) 2 4) 0

43. $\underset{x \to 4}{Lim} \frac{3-\sqrt{5+x}}{x-4} =$

1) $-\frac{1}{5}$ 2) $\frac{1}{6}$ 3) $\frac{1}{5}$ 4) $-\frac{1}{6}$

44. $\underset{x \to 0}{Lim} \frac{x^2}{1-\sqrt[3]{1+x^2}} =$

1) 1 2) $\frac{1}{2}$ 3) -3 4) $-\frac{1}{3}$

45. $\underset{x \to 1}{Lim} \frac{\sqrt[3]{x}-1}{\sqrt{x}-1} =$

1) $\frac{1}{3}$ 2) $\frac{2}{3}$ 3) 0 4) $-\frac{1}{3}$

46. $\underset{x \to 2}{Lim} \frac{x^5\sqrt{x}-32\sqrt{2}}{x^3\sqrt{x}-8\sqrt{2}} =$

1) $\frac{22}{7}$ 2) $\frac{41}{7}$ 3) $\frac{44}{7}$ 4) 2

47. $\underset{x \to 0}{Lim} \frac{\sqrt[5]{2+x}-\sqrt[5]{2-x}}{\sin hx} =$

1) 1 2) $\sqrt[5]{2}$ 3) $\frac{\sqrt{5}}{2}$ 4) $\frac{2^{\frac{1}{5}}}{5}$

48. $\underset{x \to 0}{Lim} \frac{\sqrt[3]{1+\sin x}-\sqrt[3]{1-\sin x}}{x} =$

1) 0 2) 1 3) $\frac{2}{3}$ 4) $\frac{3}{2}$

49. $\underset{x \to 0}{Lim} \frac{\sqrt{1+Tanx}-\sqrt{1-Tanx}}{\sin x} =$

1) 0 2) 1 3) 2 4) $\frac{1}{2}$

50. $\underset{x \to 0}{Lim} \frac{\sqrt{1+\sin x+\sin^2 x}-1}{x} =$

1) 0 2) 1 3) 2 4) $\frac{1}{2}$

51. $\underset{x \to 0}{Lim} \frac{\sqrt{4+x}-\sqrt[3]{8+3x}}{x} =$

1) $-\frac{1}{2}$ 2) $\frac{1}{2}$ 3) -3 4) 0

52. $\underset{x\to 0}{Lim}\frac{x\left(1-\sqrt{1-x^2}\right)}{\sqrt{1-x^2}\left(\sin^{-1}(x)^3\right)}=$

1) 1 2) $\frac{1}{2}$ 3) $-\frac{1}{2}$ 4) -1

53. $\underset{x\to 1}{Lim}\frac{\sqrt{x^2-1}+\sqrt{x-1}}{\sqrt{x^2-1}}=$

1) $1+\frac{1}{\sqrt{2}}$ 2) $1-\frac{1}{\sqrt{2}}$

3) $-1+\frac{1}{\sqrt{2}}$ 4) $-1-\frac{1}{\sqrt{2}}$

54. $\underset{x\to 0}{Lim}\frac{\sin 3x\tan 4x}{x\sin 5x}=$

1) 1 2) $\frac{5}{12}$ 3) 0 4) $\frac{12}{5}$

55. $\underset{x\to 0}{Lim}\frac{\sin 2x.\sin 3x}{3xTan4x}=$

1) $\frac{2}{3}$ 2) $\frac{3}{2}$ 3) 2 4) $\frac{1}{2}$

56. $\underset{x\to 0}{Lim}\frac{\sin 5x-\sin 3x}{x}=$

1) 2 2)1 3) $\frac{1}{2}$ 4) $\frac{1}{3}$

57. $\underset{x\to 0}{Lim}\frac{1-\cos ax}{x\sin 3x}=$

1) a^2 2) $\frac{a^2}{3}$ 3) $\frac{a^2}{6}$ 4) $-\frac{a^2}{3}$

58. $\underset{x\to 0}{Lim}\frac{1-\cos mx}{1-\cos nx}=$

1) m^2 2) n^2 3) m^2-n^2 4) $\frac{m^2}{n^2}$

59. $\underset{x\to 0}{Lim}\frac{x\sin 5x}{\sin^2 4x}=$

1) $\frac{5}{4}$ 2) $\frac{4}{5}$ 3) $\frac{5}{16}$ 4) 0

60. $\underset{x\to 5}{Lim}\frac{\sin^2(x-5)\tan(x-5)}{(x^2-25)(x-5)}=$

1) 1 2) $\frac{1}{10}$ 3) 0 4)-6

61. $\underset{x\to \frac{\pi}{2}}{Lim}\frac{\left(\frac{\pi}{2}-x\right)\sec x}{\cos ecx}=$

1) 1 2) 0 3) -1 4) $\frac{1}{\pi}$

62. $\underset{x\to \frac{\pi}{4}}{Lim}\frac{\sec x.\tan(4x-\pi)}{\sin(4x-\pi)}=$

1) $\sqrt{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) $-\sqrt{2}$ 4) $\frac{-1}{\sqrt{2}}$

63. $\underset{x\to \frac{\pi}{2}}{Lim}\frac{1-\sin x}{(\pi-2x)^2}=$

1) $\frac{1}{3}$ 2) $\frac{1}{4}$ 3) $\frac{1}{6}$ 4) $\frac{1}{8}$

64. $\underset{x\to \frac{\pi}{6}}{Lim}\frac{\sin\left(x-\frac{\pi}{6}\right)}{\frac{\sqrt{3}}{2}-\cos x}=$

1) 1 2) $\frac{1}{3}$ 3) 2 4) 0

65. $\underset{x\to 0}{Lim}\frac{\sec 4x-\sec 2x}{\sec 3x-\sec x}=$

1) $\frac{3}{2}$ 2) $\frac{2}{3}$ 3) $\frac{1}{3}$ 4) $\frac{3}{4}$

66. $\underset{x\to \alpha}{Lim}\frac{\sin x-\sin\alpha}{\cos x-\cos\alpha}=$

1) $Tan\alpha$ 2) $\sin\alpha$ 3) $\cot\alpha$ 4) $-\cot\alpha$

67. $\underset{x\to 0}{Lim}\frac{1-\cos x}{x\log(1+x)}=$

1) 1 2) 0 3) -1 4) $\frac{1}{2}$

68. $\underset{x\to 0}{Lim}\frac{\tan x-\sin x}{x^3}=$

1) 1 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) $\frac{1}{3}$

69. $\lim_{x\to 0}\frac{\cos ax-\cos bx}{x^2}=$

1) 0　2) 1　3) $\frac{a^2-b^2}{2}$　4) $\frac{b^2-a^2}{2}$

70. $\lim_{x\to 0}\frac{\tan x^{\circ}}{x}=$

1) 0　2) 1　3) $\frac{\pi}{180}$　4) π

71. $\lim_{x\to 0}\frac{1-\cos 2x^{\circ}}{x^2}=$

1) 0　2) 1　3) $\left(\frac{\pi}{180}\right)^2$　4) $2.\left(\frac{\pi}{180}\right)^2$

72. $\lim_{x\to \frac{\pi}{2}}\frac{\cos x}{\left(\frac{\pi}{2}-x\right)\sin x}=$

1) 0　2) 1　3) -1　4) $\frac{1}{2}$

73. $\lim_{x\to \frac{\pi}{2}}\frac{1-\sin x}{x\cos x}=$

1) 0　2) 1　3) 2　4) 4

74. $\lim_{x\to 0}\frac{1-\cos^3 x}{x\sin 2x}=$

1) $\frac{1}{2}$　2) $\frac{3}{2}$　3) $\frac{3}{4}$　4) $\frac{1}{4}$

75. $\lim_{x\to \frac{\pi}{2}}\left(\cos x+\cos 2x-\cos 3x\right)=$

1) 1　2) 0　3) -1　4) 3

76. $\lim_{x\to 0}\frac{\sin x\sin\left(\frac{\pi}{3}+x\right)\sin\left(\frac{\pi}{3}-x\right)}{x}=$

1) $\frac{3}{4}$　2) $\frac{1}{4}$　3) $\frac{4}{3}$　4) 0

77. $\lim_{x\to 0}\frac{e^{\alpha x}-e^{\beta x}}{\sin\alpha x-\sin\beta x}=$

1) 0　2) $\frac{1}{2}$　3) $\frac{1}{3}$　4) 1

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

1) 1　2) e　3) $\frac{1}{e}$　4) 0

79. $\lim_{x\to \frac{\pi}{2}}\left(\sec x-\tan x\right)=$

1) 0　2) $\frac{2}{\pi}$　3) $\frac{1}{\pi}$　4) π

80. $\lim_{x\to \frac{\pi}{2}}\frac{\operatorname{cosec}x-\cot x}{x}=$

1) 1　2) $\frac{1}{10}$　3) $\frac{1}{2}$　4) $\frac{1}{5}$

81. $\lim_{x\to 0}\left(\operatorname{cosec}x-\frac{1}{x}\right)=$

1) 1　2) 0　3) $\frac{1}{3}$　4) 2

82. $\lim_{x\to 0}\left(\frac{1}{\sin x}-\frac{1}{Tanx}\right)=$

1) 0　2) $\frac{1}{2}$　3) $\frac{1}{3}$　4) -1

83. $\lim_{x\to \frac{\pi}{2}}\left(\frac{\pi}{2}-x\right)\text{Tan x}=$

1) 1　2) $\frac{1}{2}$　3) -1　4) $-\frac{1}{2}$

84. $\lim_{x\to 1}(1-x)Tan\left(\frac{\pi x}{2}\right)=$

1) π　2) 2π　3) $\frac{\pi}{2}$　4) $\frac{2}{\pi}$

85. $\lim_{x\to \infty}x\cos\left(\frac{\pi}{8x}\right)\sin\left(\frac{\pi}{8x}\right)=$

1) π　2) $\frac{\pi}{2}$　3) $\frac{\pi}{8}$　4) $\frac{\pi}{4}$

86. $\lim_{x\to \frac{\pi}{2}}\left(2x\tan x-\frac{\pi}{\cos x}\right)=$

1) 1　2) $\frac{1}{2}$　3) -1　4) -2

87. $\lim_{x\to\frac{\pi}{2}} \tan x =$

1) 1 2) 0

3) $\frac{1}{\pi}$ 4) doesn't exist

88. $\lim_{x\to 0} \frac{\sin^3 ax \tan^2 bx}{x \sin^4 cx} =$

1) $\frac{ab}{c}$ 2) $\frac{a^2b^3}{c^4}$ 3) $\frac{c}{ab}$ 4) $\frac{a^3b^2}{c^4}$

89. $\lim_{x\to 0} \frac{3\sin x - \sin 3x}{x^3} =$

1) 4 2) -4 3) 8 4) -8

90. $\lim_{x\to 0} \frac{3\tan x - \tan 3x}{2x^3} =$

1) $\frac{1}{4}$ 2) $\frac{3}{4}$ 3) 4 4) -4

91. $\lim_{x\to 0} \frac{a\sin ax - b\sin bx}{\tan ax - \tan bx} =$

1) $a^2 - b^2$ 2) 0 3) $a+b$ 4) $a-b$

92. $\lim_{x\to 0} \frac{3\sin x^{o} - \sin 3x^{o}}{x^3} =$

1) 0 2) 1

3) $\left(\frac{\pi}{180}\right)^3$ 4) $4.\left(\frac{\pi}{180}\right)^3$

93. $\lim_{x\to 0} \frac{\sinh x}{x} =$

1) 0 2) 3 3) 2 4) 1

94. $\lim_{x\to 0} \frac{\sin^{-1} x - Tan^{-1}x}{x^3} =$

1) 2 2) 1 3) -1 4) $\frac{1}{2}$

95. $\lim_{x\to 0} \frac{Tan^{-1}ax}{x} =$

1) 1 2) a 3) $\frac{1}{a}$ 4) $\frac{2}{a}$

96. $\lim_{x\to 0} \frac{\sin^{-1} ax - \sin^{-1} bx}{x} =$

1) 0 2) 1 3) $a-b$ 4) $a+b$

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

1) $\frac{1}{\sqrt{2}}$ 2) $\frac{1}{\sqrt{2\pi}}$ 3) $\frac{1}{\sqrt{\pi}}$ 4) 1

98. $\lim_{x\to\frac{\pi}{4}} \frac{\cos x - \sin x}{\left(\frac{\pi}{4} - x\right)(\cos x + \sin x)} =$

1) 2 2) 1 3) 0 4)3

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

1) $\frac{10}{3}$ 2) $\frac{3}{10}$ 3) $\frac{6}{5}$ 4) 56

100. $\lim_{x\to 0} \frac{\cos(2x^3) - 1}{\sin^6 2x} =$

1) $\frac{1}{16}$ 3) $\frac{-1}{16}$ 3) $\frac{1}{32}$ 4) $\frac{-1}{32}$

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

1) 2 2) -2 3) $\frac{1}{2}$ 4) $\frac{1}{2}$

102. $\lim_{x\to 0} \left(\frac{\sin 2x}{3x} + \frac{x\sin x^2}{\sin x^3}\right) =$

1) $\frac{5}{3}$ 2) 1 3) $\frac{4}{3}$ 4) $\frac{2}{3}$

103. $\lim_{x\to 0} \frac{\sin(\pi\cos^2 x)}{x^2} =$

1) $-\pi$ 2) π 3) $\frac{\pi}{2}$ 4) $\frac{-\pi}{2}$

104. $\lim_{x\to\frac{\pi}{2}} \frac{\cot x - \cos x}{\left(\frac{\pi}{2} - x\right)^3} =$

1) $\frac{-1}{2}$ 2) $\frac{1}{2}$ 3) 2 4) -2

105. $\lim_{x\to 0} \frac{\sin(x^g)}{x}$ $(g = grades)$

1) $\frac{\pi}{180}$ 2) $\frac{\pi}{90}$ 3) $\frac{\pi}{100}$ 4) $\frac{\pi}{200}$

106. $\underset{x\to 0}{Lim}\dfrac{3\sin\left(x^{g}\right)-\sin\left(3x^{g}\right)}{x^{3}}=$

1) $\left(\dfrac{\pi}{200}\right)^{3}$ 2) $4\left(\dfrac{\pi}{200}\right)^{3}$

3) $\dfrac{\pi}{200}$ 4) $\dfrac{\pi}{100}$

107. $\underset{x\to 0}{Lim}\dfrac{\sin\left(x^{n}\right)}{\left(\sin x\right)^{m}}\left(m,n\in N\right)=0$ If

1) $m>n$ 2) $m=n$ 3) $n>m$ 4) Always

108. $\underset{x\to 0}{Lim}\dfrac{\sin x}{\sqrt{x^{2}}}=$

1) 1 2) -1 3) 0 4) doesn't exist

109. $\underset{x\to 0}{Lim}\dfrac{\sin x-x}{x^{3}}=$

1) $\dfrac{1}{3}$ 2) $\dfrac{-1}{3}$ 3) $\dfrac{1}{6}$ 4) $\dfrac{-1}{6}$

110. $\underset{x\to 0}{Lim}\dfrac{\sqrt{\cos x}-\sqrt[3]{\cos x}}{\sin^{2}x}=$

1) $\dfrac{1}{3}$ 2) $-\dfrac{1}{3}$ 3) $\dfrac{1}{12}$ 4) $-\dfrac{1}{12}$

111. $\underset{n\to\infty}{Lim}\dfrac{1+2+3+4+....n}{n^{2}}=$

1. 0 2. $\dfrac{1}{2}$ 3.0 4.-1

112. $\underset{n\to\infty}{Lim}\dfrac{2^{n}-1}{2^{n}+1}=$

1. 1 2. $\dfrac{1}{2}$ 3.-1 4. 0

113. $\underset{n\to\infty}{Lim}\dfrac{2^{\frac{1}{n}}-1}{2^{\frac{1}{n}}+1}=$

1. 1 2. $\dfrac{1}{2}$ 3.-1 4. 0

114. $\underset{n\to\infty}{Lim}\dfrac{n!}{(n+1)!-n!}=$

1. 1 2. 1/2 3.-1 4. 0

115. $\underset{n\to\infty}{Lim}\dfrac{(n+2)!+(n+1)!}{(n+3)!}=$

1. 1 2. 1/2 3.0 4.2

116. $\underset{n\to\infty}{Lim}\dfrac{(n+2)!+(n+1)!}{(n+2)!-(n+1)!}=$

1. 1 2. $\dfrac{1}{2}$ 3. $-\dfrac{1}{2}$ 4. $\dfrac{1}{3}$

117. $\underset{n\to\infty}{Lim}\left(\dfrac{1+2+3+....n}{n+2}-\dfrac{n}{2}\right)=$

1. 1 2. $\dfrac{1}{2}$ 3. $-\dfrac{1}{2}$ 4. $\dfrac{1}{3}$

118. $\underset{x\to\infty}{Lim}\dfrac{(x+1)^{10}+(x+2)^{10}+.....+(x+100)^{10}}{x^{10}+10^{10}}=$

1. 10 2.100 3.1000 4.1

119. $\underset{x\to\infty}{Lim}\left(\dfrac{x^{3}}{2x^{2}-1}-\dfrac{x^{2}}{2x+1}\right)=$

1. 1 2. $\dfrac{1}{2}$ 3. $\dfrac{1}{3}$ 4. $\dfrac{1}{4}$

120. $\underset{x\to\infty}{Lim}\dfrac{\sqrt{x^{2}+1}-\sqrt[3]{x^{2}+1}}{\sqrt[4]{x^{4}+1}-\sqrt[5]{x^{2}+1}}=$

1. 1 2.-1 3.0 4. ∞

121. $\underset{n\to\infty}{Lim}\dfrac{1+3+5+.....+(2n-1)}{2+4+6+....+2n}=$

1. 0 2. 1 3. -1 4.5

122. $\underset{n\to\infty}{Lim}\dfrac{2^{3n}}{3^{2n}}=$

1. 0 2. 1 3. $\dfrac{2}{3}$ 4. $\dfrac{3}{2}$

123. $\underset{n\to\infty}{Lim}\dfrac{3^{n+1}+2^{n+2}}{3^{n-1}+2^{n-2}}=$

1. 4 2. $\dfrac{5}{2}$ 3.9 4.8

124. $\underset{n\to\infty}{Lim}\dfrac{1^{2}+2^{2}+3^{2}+....+n^{2}}{2n^{3}+3n^{2}+4n+1}=$

1. $\dfrac{1}{3}$ 2. $\dfrac{1}{6}$ 3. $\dfrac{1}{10}$ 4. $\dfrac{1}{12}$

125. $\underset{n\to\infty}{Lim}\dfrac{1+2+3+....+n}{(n+2).(2n+3)}=$

1. $\dfrac{1}{4}$ 2. 4 3. 0 4. $\dfrac{12}{5}$

126. $\lim_{x\to-\infty} \tanh x =$

1.1 2.-1 3.0 4. $\frac{1}{2}$

127. $\lim_{x\to\infty} \frac{x+\sin x}{x+\cos x} =$

1.1 2.-1 3. $\frac{1}{3}$ 4.0

128. For a>1 then $\lim_{x\to\infty} \frac{a^x - a^{-x}}{a^x + a^{-x}} =$

1.1 2. $\frac{1}{2}$ 3. $\frac{1}{3}$ 4. $\frac{1}{15}$

129. If f(x)= $\sqrt{\frac{x-\sin^2 x}{x+\cos x}}$ then $\lim_{x\to\infty} f(x) =$

1. $\frac{1}{2}$ 2.-1 3.0 4.1

130. $\lim_{x\to\infty} \frac{x-\log x}{x+\log x} =$

1. 1 2.-1 3. 0 4. 2

131. $\lim_{x\to\infty} \frac{]X[}{\log x} =$

1.0 2.-1

3. ∞ 4. Does not exist

132. $\lim_{x\to\infty} \frac{12x^2+3x+11}{3x^2-7x+8} =$

1. 1 2. 0 3. $\frac{4}{3}$ 4. 4

133. $\lim_{x\to\infty} \left(\frac{x+1}{x+2}\right)\left(\frac{2x+3}{3x+4}\right) =$

1. $\frac{2}{3}$ 2. 0 3. $\frac{1}{3}$ 4. $\frac{1}{4}$

134. $\lim_{x\to\infty} \frac{x}{\sqrt{4x^2+1}-1} =$

1. 1 2. -1 3. $\frac{1}{3}$ 4. $\frac{1}{2}$

135. $\lim_{n\to\infty} \frac{n^3-100n^2+1}{100n^2+15n} =$

1. 0 2. $\frac{1}{2}$ 3. ∞ 4. $-\infty$

136. $\lim_{n\to\infty} \frac{\sqrt[3]{n^3+2n-1}}{n+2} =$

1. 0 2.2 3.-1 4. 1

137. $\lim_{n\to\infty} \frac{1+\frac{1}{2}+\frac{1}{4}+....+\frac{1}{2^n}}{1+\frac{1}{3}+\frac{1}{9}+....+\frac{1}{3^n}} =$

1. $\frac{4}{3}$ 2. $\frac{3}{4}$ 3. $\frac{1}{2}$ 4. 0

138. $\lim_{n\to\infty} \left(\frac{1}{1.2}+\frac{1}{2.3}+....+\frac{1}{(n-1)n}\right) =$

1. 1 2.-1 3. $\frac{1}{2}$ 4. 0

139. $\lim_{n\to\infty} \left(\frac{1}{1.3}+\frac{1}{3.5}+....+\frac{1}{(2n-1)(2n+1)}\right) =$

1. 1 2. $\frac{1}{2}$ 3. $\frac{1}{3}$ 4. $\frac{1}{4}$

140. $\lim_{x\to\infty} \frac{8|X|+3X}{3|X|-2X} =$

1. 11 2. 8 3. 0 4. $\frac{1}{8}$

141. $\lim_{n\to\infty} \frac{\sqrt{3+4n^4}}{1+2+3+....+n} =$

1. $2\sqrt{6}$ 2. $\frac{1}{4}$ 3. 4 4.1

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

1. $\frac{1}{e}$ 2. e^3 3. $\frac{1}{e^2}$ 4. e^2

143. $\lim_{n\to\infty} \left(\frac{n}{n+1}\right)^n =$

1. 1 2. $-\frac{1}{e}$ 3. $\frac{1}{e}$ 4. 1+e

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

1. e^2 2. e^6 3. e^{-5} 4. e^{-6}

145. $\lim_{x\to\infty}\left(\frac{3x-4}{3x+2}\right)^{\frac{x+1}{3}} =$

1. $e^{-2/3}$ 2. $e^{3/2}$ 3. $e^{2/3}$ 4. e

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

1. e 2. $\frac{1}{e}$ 3. e^2 4. e^{-2}

147. $\lim_{x\to\infty}\left(1+\frac{2}{x}\right)^{x+7} =$

1. e 2. $\frac{1}{e}$ 3. e^2 4. e^{-2}

148. $\lim_{y\to\infty}\left(1+\frac{x}{y}\right)^{2y} =$

1. e^{2x} 2. e^{-2x} 3. e^x 4. e^{-x}

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

1. 1 2. $\frac{1}{2}$ 3. 0 4. -1

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

1. -1 2. 0 3. $\frac{1}{2}$ 4. 1

151. $\lim_{x\to\infty}\left(\sqrt{x^2-2x-1}-\sqrt{x^2-7x+3}\right) =$

1. $\frac{5}{2}$ 2. $\frac{2}{5}$ 3. $\frac{1}{5}$ 4. 0

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

1. 0 2. $\frac{a}{2}$ 3. $-\frac{a}{2}$ 4. a

153. $\lim_{n\to\infty}\left(\frac{1}{1-n^2}+\frac{2}{1-n^2}+..............+\frac{n}{1-n^2}\right)=$

1. 1 2. $\frac{1}{3}$ 3. $-\frac{1}{2}$ 4. 2

154. $\lim_{x\to\infty}\left\{x\sqrt{x^2+a^2}-\sqrt{x^4+a^4}\right\}=$

1. a^2 2. $2a^2$ 3. $\frac{a^2}{2}$ 4. $-a^2$

155. $\lim_{x\to\infty} x\cos\frac{\pi}{8x}\sin\frac{\pi}{8x} =$

1. π 2. $\frac{\pi}{2}$ 3. $\frac{\pi}{8}$ 4. $\frac{\pi}{4}$

156. $\lim_{x\to\infty}\left[\frac{(2+x)^{40}(4+x)^5}{(2-x)^{45}}\right]$ equals to

1) -1 2) 1 3) 16 4) 32

157. $\lim_{x\to\infty}\frac{x^n}{e^x}=0$ for

1) n = 0 only
2) n is any whole number
3) n =2 only 4) no value of n

158. $\lim_{x\to\infty} 5^x \sin\left(\frac{a}{5^x}\right)=$

1) 1 2) a 3) ∞ 4) not defined

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

1) e 2) e^{-1} 3) e^{-5} 4) e^5

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

1) 0 2) 1 3) 2 4) –1

161. $\lim_{x\to 0} x \cdot \cos\frac{1}{x} =$

1. 1 2. -1 3. $\frac{1}{2}$ 4. 0

162. $\lim_{x\to\infty}\frac{x}{\sqrt{ax^2+b}-\sqrt{cx^2+d}}=$

1) $\frac{1}{\sqrt{a}+\sqrt{c}}$ 2) $\frac{1}{\sqrt{c}-\sqrt{a}}$

3) $\frac{1}{\sqrt{a}-\sqrt{c}}$ 4) $\frac{1}{a-c}$

163. $\lim_{x\to\infty}\frac{\sqrt[7]{x^7-1}+\sqrt[5]{x^5+2}+\sqrt[9]{x^9-2}}{\sqrt[6]{x^6+1}+\sqrt[5]{x^5+1}-\sqrt[4]{x^4+4}}=$

1) 3 2) – 3 3) 1/3 4) – 1/3

164. a,b,c,d are +ve real numbers

$\lim_{n\to\infty}\left[1+\frac{1}{a+bn}\right]^{c+dn} =$

1) e^{db} 2) e^{d-b} 3) $e^{d/b}$ 4) $e^d.e^b$

165. $f(x)=x^2$, $\phi(a)=b^2$, $f'(a)=n\phi'(a)$ and $\Phi'(a)\neq 0$ then $\lim_{x\to a}\left(\frac{\sqrt{f(x)}-a}{\sqrt{\phi(x)}-b}\right)$

1) $\frac{b}{a}$ 2) $\frac{nb}{a}$ 3) $\frac{a}{b}$ 4) $\frac{na}{b}$

166. $\lim_{x\to 0}\frac{\sin(\pi\cos^2 x)}{x^2}=$

1) $-\pi$ 2) π 3) $\pi/2$ 4) 1

167. $\lim_{x\to 0}\frac{\log_e^{(1+x)}}{3^x-1}$

1) $\log_e^3$ 2) 0 3) 1 4) $\log_3^e$

168. If $\lim_{x\to 5}\frac{x^k-5^k}{x-5}=500$, then the positive integral value of k is

1) 3 2) 4 3) 5 4) 6

169. $\lim_{n\to\infty}\left[\cos\left(\frac{x}{n}\right)\right]^n=$

1) e 2) $\frac{1}{e}$ 3) 1 4) 2

170. $\lim_{x\to 0}(1+2x)^{\frac{1}{3x}}=$

1. e^2 2. $e^{\frac{3}{2}}$ 3. $e^{\frac{2}{3}}$ 4. e^{-2}

171. $\lim_{x\to 0}(1-3x)^{\frac{1}{5x}}=$

1. $e^{-\frac{3}{5}}$ 2. $e^{\frac{5}{3}}$ 3. $e^{\frac{-5}{3}}$ 4. e^{-1}

172. $\lim_{x\to\frac{\pi}{2}}(1+3\cos x)^{\sec x}=$

1. e^2 2. e^3 3. e^{-2} 4. e^{-3}

173. $\lim_{x\to\pi}(1-4\tan x)^{\cot x}=$

1. e 2. e^4 3. e^{-1} 4. e^{-4}

174. $\lim_{x\to 1}=(2-x)^{\tan\left(\frac{\pi x}{2}\right)}$

1. $e^{\frac{1}{\pi}}$ 2. $e^{\frac{2}{\pi}}$ 3. $-e^{\frac{2}{\pi}}$ 4. e

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

1. e 2. $\frac{1}{e}$ 3. -e 4. 0

176. $\lim_{x\to 0}(\sin x+\cos x)^{\frac{1}{x}}=$

1. -e 2. e^{-1} 3. e 4. $\frac{1}{e}$

177. $\lim_{x\to 0}(1+\sin x)^{\frac{1}{x}}=$

1. e 2. e^2 3. e^3 4. $\frac{1}{e}$

178. $\lim_{x\to\infty}(1+3\tan^2 x)^{Cot^2 x}=$

1. e 2. e^2 3. e^3 4. 1

179. $\lim_{x\to\infty}\left(1+2\sin^2 x\right)^{\operatorname{cosec}^2 x}=$

1. e 2. e^2 3. e^3 4. 1

180. $\lim_{x\to 1}x^{\left(\frac{1}{1-x^2}\right)}=$

1. $e^{-\frac{1}{2}}$ 2. $e^{\frac{2}{3}}$ 3. $e^{-\frac{3}{2}}$ 4. e

181. $\lim_{x\to 0+}(Sinx)^{\tan x}=$

1. e 2. e^2 3. -1 4. 1

182. $\lim_{x\to\frac{\pi}{4}}(Tanx)^{\tan 2x}=$

1. e 2. $\frac{1}{e}$ 3. $\frac{1}{e^2}$ 4. 2

183. $\lim_{x\to 1}\left(1-x^2\right)^{\frac{1}{\log(1-x)}}=$

1. e 2. $\frac{1}{e}$ 3. $\frac{1}{e^2}$ 4. e^2

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

1. e 2. -e 3. 1 4. 0

185 The value of $\lim_{x\to 0}\left(\frac{1+5x^2}{1+3x^2}\right)^{1/x^2}=$

1) e 2) e^2 3) 1/e 4) 0

186. $\lim_{x\to\infty}\left[\frac{x^2\sin\left(\frac{1}{x}\right)-x}{1-|x|}\right]=$

1) 0 2) 1 3) – 1 4) 2

187. $\lim_{x\to\infty}2^{-x}\sin(2^x)=$

1) 1 2) 0

3) 2 4) does not exist

188. $\lim_{x\to\infty} e^x \sin\left(\frac{d}{e^x}\right) =$

1) 0 2) d
3) 2 4) does not exist

189. $\lim_{n\to\infty} (\pi n)^{2/n} =$

1) 0 2) 1 3) 2 4) 3

190. $\lim_{n\to\infty} \left(\frac{e^n}{\pi}\right)^{1/n} =$

1) 0 2) 1 3) e^2 4) e

191. $\lim_{n\to\infty} \frac{(1+2+3+......+n\,terms)(1^2+2^2+......n\,terms)}{n(1^3+2^3+.....+n\,terms)} =$

1) $\frac{3}{2}$ 2) $\frac{2}{3}$ 3) 1 4) 0

192. $\lim_{x\to 0} \frac{\sin x}{|x|} =$

1) 0 2) -1
3) 1 4) does not exist

193. $\lim_{n\to\infty} \left(1+\sin\left(\frac{a}{n}\right)\right)^n =$

1) e 2) e^a 3) a^e 4) ae

194. $\lim_{x\to a} \frac{x-a}{|x-a|} =$

1) 0 2) 1
3) -1 4) does not exist

195. $\lim_{x\to\infty} \frac{(2+x)^{20}(4+x)^3}{(2-x)^{23}} =$

1) -1 2) 1 3) 16 4) 32

196. $\lim_{x\to 0} \frac{(1+x)^{\frac{1}{m}}-(1-x)^{\frac{1}{m}}}{(1+x)^{\frac{1}{n}}-(1-x)^{\frac{1}{n}}} =$

1) 1 2) $\frac{m+n}{m-n}$ 3) $\frac{n}{m}$ 4) $\frac{m}{n}$

197. The function f(x)= $\frac{x\tan 2x}{\sin 3x.\sin 5x}$ for $x \neq 0$,
= k for x=0, is continuos at x=0, then f(0)

1. $\frac{2}{13}$ 2. $\frac{2}{17}$ 3. $\frac{2}{11}$ 4. $\frac{2}{15}$

198. If f(x)= $\frac{1-\cos ax}{1-\cos bx}$ for $x \neq 0$, is continuous at x=0 then f(0) =

1. $\frac{a^2}{2}$ 2. $\frac{a}{b^2}$ 3. $\frac{a}{b}$ 4. $\left(\frac{a}{b^2}\right)^2$

199. The function f(x)=[x]at x= 5, is
1.Left continuous 2.Right continuous
3.continuous
4.cannot be determined

200. The discontinuous points of f(x)= $\frac{1}{\log|x|}$ are

1.0, ± 2 2.1, ± 2 3.0, ± 1 4.0, ± 3

201. The function defined by $f(x) = x.\sin\frac{1}{x}$ for $x \neq 0$
=0 for x=0 is .... at x = 0
1. continuous 2. right continuous
3. left continuous 4. can not be determined

202. The function $f(x) = (1+x)^{\frac{5}{x}}$ for $x \neq 0$, $= e^5$ for x = 0 ----- at x=0
1. continuous 2. right continuous
3. left continuous 4. can not be determined

203. The value of f(0) so that the function

f(x) = $\frac{2x-\sin^{-1}x}{2x+\tan^{-1}x}$ is continuous at x = 0, is

1. 2 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{-1}{3}$

204. If the function f(x) = $\frac{\sin^2 ax}{x^2}$ for $x \neq 0$
=1 for x=0 is continuous at x = 0 then a =

1. ± 1 2. 0 3. $\pm\frac{1}{2}$ 4. $\pm\frac{1}{3}$

205. If the function f(x) = $\frac{e^{x^2}-\cos x}{x^2}$ for $x \neq 0$ is continuous at x=0 then f(0) =

1) $\frac{1}{2}$ 2. $\frac{3}{2}$ 3. 2 4. $\frac{1}{3}$

206. If the function f(x)= $(1+3x)^{\frac{1}{x}}$ for $x \neq 0$ is continuous at x=0 then f(0)=

1.3 2. $\frac{1}{e}$ 3. e^2 4. e^3

207. The interval on which f(x)= $\sqrt{1-x^2}$ is continuous in
1.$(0,\infty)$ 2. $(1,\infty)$ 3.[-1,1] 4.$(-\infty,-1)$

208. If the function f(x)= $\dfrac{\log(1+ax)-\log(1-bx)}{x}$ for $x \neq 0$ is continuous at x=0 then f(0)=
1.a-b 2.a+b
3.loga+logb 4.loga-logb

209. A point of discontinuity of f(x)=tanx is
1.x=0 2.x= $\dfrac{\pi}{4}$ 3.x= $\dfrac{\pi}{3}$ 4. x= $\dfrac{\pi}{2}$

210. The function f(x) = $\dfrac{1+\sin x-\cos x}{1-\sin x-\cos x}$ is not defined at x=0. The value of f(0) so that f(x) is continuous at x=0 is
1. 1 2. -1 3. 0 4. 2

211. The function f(x) = $\dfrac{\cos x-\sin x}{\cos 2x}$ is not defined at $x=\dfrac{\pi}{4}$. The value of $f\left(\dfrac{\pi}{4}\right)$ so that f(x) is continuous at $x=\dfrac{\pi}{4}$ is
1. $\dfrac{1}{\sqrt{2}}$ 2. $\sqrt{2}$ 3. $-\sqrt{2}$ 4. 1

212. The value of f(0) for $f(x) = (1+\tan^2\sqrt{x})^{\frac{1}{2x}}$ so that f(x) is continuous everywhere is
1. e 2. $\dfrac{1}{2}$ 3. $e^{\frac{1}{2}}$ 4. 0

213. If the function f(x) = $\dfrac{2^{x+2}-16}{4^x-16}$ for $x \neq 2$ = A for x = 2 is continuous at x = 2, then A =
1. 2 2. 1/2 3. 1/4 4. 0

214. If $f(x)=\begin{cases} 1+x & x\le 1 \\ 3-ax^2 & x>1 \end{cases}$ is continuous at x = 1 then a is _____ (a>0)
1. 1 2. 2 3. -1 4. -2

215. The value of f(0) for the function f(x) $= \dfrac{2-\sqrt{x+4}}{\sin 2x}$ is continuous at x = 0 is
1. $\dfrac{1}{8}$ 2. $\dfrac{1}{4}$ 3. $\dfrac{-1}{8}$ 4. $-\dfrac{1}{4}$

216. The value of f(0) for the function f(x) = $\dfrac{e^x-e^{-x}}{x}$ so that it is continuous everywhere is
1. 1 2. $\dfrac{1}{2}$ 3. 2 4. 0

217. If $f(x) = \begin{cases} (\cos x)^{\frac{1}{x}} & x \neq 0 \\ k & x = 0 \end{cases}$ and if f(x) is continuous at x = 0 then k =
1. 1 2. 0 3. -1 4. e

218. The integer x for which $\lim\limits_{x\to 0}\dfrac{(\cos x-1)(\cos x-e^x)}{x^3}$ is a finite non-zero number is
1. 1 2. $\dfrac{1}{4}$ 3. $\dfrac{1}{2}$ 4. $-\dfrac{1}{2}$

219. If f(x) = $\dfrac{\sqrt{1+px}-\sqrt{1-px}}{x}$, $-1 \le x < 0$
$= \dfrac{2x+1}{x-2}$, $0 \le x \le 1$ is continuous in the interval [-1,1] then p =
1. -1 2. $\dfrac{-1}{2}$ 3. $\dfrac{1}{2}$ 4. 1

220. At x=0 if f(x) = $(1+x)^{\text{Cotx}}$ is continuous then f(0)=
1. 0 2. 1 3. e 4. e^{-1}

221. Let f(x) = $\dfrac{(e^{kx}-1).\sin kx}{x^2}$, for $x \neq 0$ = 4, for x = 0 is continuous at x = 0 then k =
1. ± 1 2. ± 2 3.0 4. ± 3

222. If the function defined by f(x) = $\dfrac{\sin 3(x-p)}{\sin 2(x-p)}$ for $x \neq p$ is continuous at x = p then f(p) =
1. $\dfrac{3}{2}$ 2. $\dfrac{2}{3}$ 3.6 4. $\dfrac{1}{6}$

223. Let f(x) = $\dfrac{3x+4\tan x}{x}$, for $x \neq 0$ = 7, for x = 0 then f(x) is
1. continuous at x = 0
2. not continuous at x = 0
3. not determined at x = 0
4. $\underset{x\to 0}{Lt} f(x) = 8$

224. The function f(x) = $\frac{|x|}{x}$ at x = 0 is

1. left continuous 2. right continuous
3. continuous 4.Discontinuous

225. A point of discontinuity of $f(x)=[x]$ is

1) $\frac{1}{2}$ 2) -$\frac{1}{2}$ 3) 1 4) 2/3

226. The function $f(x) = \begin{cases} 5 & when \ 0<x<1 \\ 8 & when \ 1<x<2 \\ 15 & when \ 2<x\le 3 \end{cases}$ is discontinuous

1) at x = 1, 2 2) at x = 4
3) at x = 0 4) at x = 3

227. If the function $f(x)=\begin{cases} \frac{1-\cos 4x}{x^2} & if \ x<0 \\ a & if \ x=0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4} & if \ x>0 \end{cases}$ is continuous at x = 0 then a =

1) 8 2) $\frac{1}{8}$ 3) -8 4) 0

228. The value of f(0) so that the function f (x) = $\frac{\log\left(1+\frac{x}{a}\right)-\log\left(1-\frac{x}{b}\right)}{x}$ ($x \ne 0$) is continuous at x = 0 is

1) $\frac{a+b}{ab}$ 2) $\frac{a-b}{ab}$ 3) $\frac{ab}{a+b}$ 4) $\frac{ab}{a-b}$

229. If $f(x)=\begin{cases} 5x-4 & 0<x\le 1 \\ 4x^2+3bx & 1<x<2 \end{cases}$ and if f(x) is continuous in the interval (0,2) then b =

1) -1 2) 0 3) 1 4) $\frac{13}{3}$

230. If the function $f(x)=\begin{cases} \frac{kCosx}{\pi-2x}, & x\ne\frac{\pi}{2} \\ 3 & at \ x=\frac{\pi}{2} \end{cases}$ is continuous at $x=\frac{\pi}{2}$ then k =

1) 2 2) 4 3) 6 4) 8

231. Let $f(x)=3x-4 \quad for \ 0\le x\le 2$
$\quad = 2x+\lambda \quad for \ 2<x\le 3$

If f(x) is continuous at x = 2, then λ is

1) -1 2) 0 3) -2 4) 2

232. The funcion f(x)=$\frac{|x-3|}{x-3}$ at x=3, is

1.Left continuous 2.Right continuous
3.continuous 4. discontinuous

233. The function f(x)=$\frac{\sin 2x.\sin 3x}{x^2}$ for $x\ne 0$, f(0) = 6 at x = 0, is

1. continuous 2.discontinuous
3. left continuous 4. right continuous

234. The function f(x)=$\frac{\cos 3x-\cos 4x}{x\sin 2x}$ for $x\ne 0$,

f(0) = $\frac{7}{4}$ at x=0, is

1.Continuous 2.discontinuous
3. left continuous 4. right continuous

235. The function f(x)=$\frac{3\sin x-\sin 3x}{x^3}$ for $x\ne 0$,

f(0)=1 at x =0, is

1.Continuous 2.discontinuous
3. left continuous 4. right continuous

236. If f (x)=$\frac{1-\cos ax}{1-\cos bx}$ for $x\ne 0$,is continuous at x=0 then f(0) =

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

3. $\frac{a}{b}$ 4. $\left(\frac{a}{b}\right)^2$

237. If $f(x)=\frac{x^3+8}{x^5+32}$, $x\ne -2$ and f(–2) = k is continuous at x = – 2 then k =

1) 1/4 2) 3/20 3) 3/5 4) 4/5

238. f(x) = [x] is continuous

1)R 2) Z 3) N 4) R – Z

239. $f(x)=\frac{e^{1/x^2}}{e^{1/x^2}-1}, x\ne 0$ f(0)= 1, then f at x = 0

1) discontinuous 2) left continuous
3) right continuous 4) both 2 and 3

240. $f(x)=x\left[3-\log\left(\frac{\sin x}{x}\right)\right]-2$ to be continuous at x =0, then f(0) =

1) 0 2) 2 3) – 2 4) 3

241. A function f(x) is defined as

$$f(x)=\begin{cases} ax-b & x\le 1 \\ 3x, & 1<x<2 \\ bx^2-a & x\ge 2 \end{cases}$$ is continuous at x =1, 2 then

1) a = 5, b = 2 2) a = 6, b = 3

3) a = 7, b = 4 4) a = 8, b = 5

242. If $$f(x)=\begin{cases} (1+|\sin x|)^{\frac{a}{|\sin x|}} & -\frac{\pi}{6}<x<0 \\ b & x=0 \\ e^{\frac{\tan 2x}{\tan 3x}} & 0<x<\frac{\pi}{6} \end{cases}$$ is continuous at x = 0 then

1) $a=e^{2/3},b=2/3$ 2) $a=2/3,b=e^{2/3}$

3) $a=1/3,b=e^{1/3}$ 4) $a=e^{1/3},b=e^{1/3}$

243. If $f(x)=\frac{x(e^{1/x}-e^{-1/x})}{e^{1/x}+e^{-1/x}}$, $x\ne 0$ is continuous at x = 0, then f(0) =

1) 1 2) 2 3) 0 4) 3

244. $$f(x)=\begin{cases} 2x-1 & if & x>2 \\ k & if & x=2 \\ x^2-1 & if & x<2 \end{cases}$$ is continuous at x= 2 then k =

1) 1 2) 2 3) 3 4) 4

245. $$f(x)=\begin{cases} \frac{x^3+x^2-16x+20}{(x-2)^2}(x\ne 2) & If\ x=2 \\ =k \end{cases}$$ if $x\ne 2$ f(x) is continuous at x = 2 then

1) k = 3 2) k = 5

3) k = 7 4) k = 9

246. f(x) = |x|+|x–1| is continuous at

1) 0 only 2) 0,1 only

3) every where 4) no where

247. f(x) = [x]+|x–1| is

1) continuous at x =0, 1

2) continuous at x = 0 only

3) continuous at x = 1 only

4) discontinuous at x =0, 1

248. $f(x)=\frac{P+q^{\frac{1}{x}}}{r+s^{\frac{1}{x}}},s>1,q>1,r\ne 0$, f(0) = 1 is left continuous at x =0 then

1) p =0 2) p = r 3) p = q 4) $p\ne q$

249. The set of points of discontinuity of the $f(x)=\frac{1}{x^2+x+1}$

1) ϕ 2) R 3) {0} 4) R^-

250. Set of points of discontinuity of $\frac{x^2}{|x|}=$

1) {0} 2) R 3) R^+ 4) Z

251. $$f(x)=\begin{cases} -2\sin x & if & x\le -\frac{\pi}{2} \\ a\sin x+b & if & -\frac{\pi}{2}<x<\frac{\pi}{2} \\ \cos x & if & x\ge \frac{\pi}{2} \end{cases}$$ and f(x) is continuous at every where then (a,b) =

1) (1,1) 2) (–1,1) 3) (1, –1) 4) (–1,–1)

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

1) 11 2) 2 3) 12 4) 10

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

1) 4 2) 0 3) 2 4) ∞

254. $\lim_{x\to 0}\left[\frac{\sin(2x)}{3x}+\frac{x\sin(x^2)}{\sin(x^3)}\right]=$

1) $\frac{5}{3}$ 2) 1 3) $\frac{4}{3}$ 4) $\frac{2}{3}$

255. $\lim_{n\to\infty}\frac{n^k\sin^2(n!)}{n+2}$, $0<k<1$

1) ∞ 2) 1 3) 0 4) 2

KEY

1) 1	2) 2	3) 3	4) 1
5)1	6) 4	7) 1	8) 2
9) 1	10) 1	11) 1	12) 3
13) 2	14) 4	15) 2	16) 1
17) 1	18) 4	19) 1	20) 1
21) 1	22) 1	23) 1	24) 2
25) 3	26) 1	27) 2	28) 2
29) 3	30) 2	31) 1	32) 2
33)4	34) 3	35) 2	36) 4
37) 3	38)3	39) 2	40) 2
41) 1	42) 1	43) 4	44) 3
45)2	46) 3	47) 4	48) 3
49)2	50)4	51) 4	52) 2
53) 1	54) 4	55) 4	56) 1
57) 3	58) 4	59) 3	60) 3
61) 1	62) 1	63) 4	64) 2
65) 1	66) 4	67) 4	68) 2
69) 3	70) 3	71) 4	72) 2
73) 1	74) 3	75) 3	76) 1
77) 4	78) 1	79) 1	80) 1
81) 2	82) 1	83) 1	84) 4
85) 3	86) 4	87) 4	88) 1
89) 1	90) 4	91) 3	92) 4
93) 4	94) 4	95) 2	96) 3
97) 2	98) 2	99) 1	100) 4
101) 2	102) 1	103) 2	104) 2
105) 4	106) 2	107) 3	108) 4
109) 4	110) 4	111) 2	112) 1
113) 4	114) 4	115) 3	116) 1
117)3	118) 2	119) 4	120) 1
121) 2	122) 1	123) 3	124) 2
125) 1	126) 2	127)1	128)1
129) 4	130) 1	131) 1	132) 4
133) 1	134) 4	135) 3	136) 4
137) 1	138) 1	139) 2	140) 1
141) 3	142) 3	143) 3	144) 2
145) 1	146) 3	147) 3	148) 1
149) 1	150) 4	151) 1	152) 2
153) 2	154) 3	155) 3	156) 1
157) 2	158) 2	159) 3	160) 1

161) 4	162) 3	163) 1	164) 3
165) 2	166) 2	167) 4	168) 2
169) 3	170) 3	171) 1	172) 2
173) 4	174) 2	175) 1	176) 3
177) 1	178) 3	179) 2	180) 1
181) 4	182) 2	183) 1	184) 3
185) 3	186) 1	187) 2	188) 2
189) 2	190) 4	191) 3	192) 4
193) 2	194) 4	195)1	196)3
197)4	198) 4	199)2	200) 3
201) 1	202) 1	203) 2	204) 1
205) 2	206) 4	207) 3	208) 2
209) 4	210) 1	211) 2	212) 3
213) 2	214) 1	215) 3	216) 3
217) 1	218) 3	219) 2	220) 3
221) 2	222) 1	223) 1	224) 4
225) 3	226) 1	227) 1	228) 1
229) 1	230) 3	231) 3	232) 4
233) 1	234) 1	235) 2	236) 4
237) 2	238) 4	239) 4	240) 3
241) 1	242) 2	243) 3	244) 3
245)3	246) 3	247) 4	248) 2
249) 1	250) 1	251) 2	252) 3
253) 1	254) 4	255) 3	

HINTS

19. Use L - Hospital rule

46. $\underset{x\to 2}{Lt}\dfrac{x^{11/2}-2^{11/2}}{x^{7/2}-2^{7/2}}$

48. Use L - Hospital rule

57. $\underset{x\to 0}{Lt}\dfrac{2\sin^2\dfrac{ax}{2}}{x\sin 3x}=\dfrac{2\text{x}\dfrac{a^2}{4}}{3}$

68. Take tanx common from the Nr.

79. $\underset{x\to 0}{\text{Lt}}\dfrac{e^x\left[e^{\tan x}-1\right]}{\tan x-x}$

118. $\underset{x\to 0}{\text{Lt}}\dfrac{x^{10}\left[(1+\frac{1}{x})^{10}+(1+\frac{2}{x})^{10}+........+(1+\frac{100}{x})^{10}\right]}{x^{10}[1+\frac{10^{10}}{x^{10}}]}$

137. $S_\infty = \frac{a}{1-r}$

144. $\underset{x\to a}{Lt} f(x) = 1$ and $\underset{x\to a}{Lt} g(x) = \infty$ then

$\underset{x\to a}{Lt}(f(x))^{g(x)} = e^{\underset{x\to a}{Lt}(f(x-1))g(x)}$

196. Use L.Hospital rule

228. Use L - Hospital rule

243. $\underset{x\to 0}{Lt}\, e^{-\frac{1}{x}} = 0$

252. Use L - Hospital rule

253. Use L - Hospital rule

LEVEl - II

1. $\underset{x\to a}{Lt}\frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}} =$

1) $\frac{2}{\sqrt{3}}$ 2) $-\frac{1}{\sqrt{3}}$ 3) $\frac{2}{3\sqrt{3}}$ 4) $\frac{1}{\sqrt{3}}$

2. $\underset{x\to 0}{Lt}\frac{(1+x)^3-1-3x}{(1+x)^2-1-2x} =$

1) 1 2)3 3)5 4)-2

3. $\underset{x\to 2}{Lt}\frac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}} =$

1)8 2) $\frac{1}{8}$ 3) $\frac{1}{3}$ 4)-8

4. $\underset{x\to 0}{Lt}\frac{\sqrt{1+x}-\sqrt{1+x^2}}{\sqrt{1-x^2}-\sqrt{1-x}} =$

1) 1 2) -1 3)0 4)2

5. $\underset{x\to 1}{Lt}\left(\frac{1}{1-x}-\frac{3}{1-x^3}\right) =$

1) 1 2) -1 3) $\frac{1}{2}$ 4) $-\frac{1}{2}$

6. $\underset{x\to 1}{Lt}\frac{x^x-x}{1-x+\log x} =$

1) $\frac{-2}{3}$ 2) -1 3) -2 4) $\frac{1}{4}$

7. $\underset{x\to 0}{Lt}\frac{9^x-2.6^x+4^x}{\sin^2 x} =$

1) $\left(\log\frac{3}{2}\right)^2$ 2) $\left(\log\frac{2}{3}\right)^3$

3) $\left(\log\frac{3}{2}\right)$ 4). $\left(\log\frac{2}{3}\right)$

8. $\underset{x\to 0}{Lim}\frac{27^x-9^x-3^x+1}{\sqrt{2}-\sqrt{1+\cos x}} =$

1) 0 2) $8\sqrt{2}\,(\log 3)^2$

3) $8\,(\log 3)^2$ 4) 1

9. $\underset{x\to -2}{Lt}\frac{x^4+2x^3+3x^2+5x-2}{x^5+3x^4+2x^3+3x^2+7x+2} =$

1) 0 2) 1 3) –1 4) –5

10. If $\underset{x\to 5}{Lt} f(x) = 4$ then $\underset{y\to 1/3}{Lt} f(15y) =$

1) 1 2) $\frac{1}{3}$ 3) $\frac{4}{3}$ 4)4

11. $\underset{x\to 4^+}{Lt}\frac{x^2-7x+12}{x-[x]} =$

1) 1 2) 0

3) 2 4) does not exists

12. $\underset{x\to o}{Lt}\frac{e^x+\log\left(\frac{1-x}{e}\right)}{\tan x - x} =$

1) 1/3 2) –1/2 3) 2 4) 1

13. $\underset{x\to 0}{Lt}\frac{\mathrm{Sin}2x+2\mathrm{Sin}^2x-2\mathrm{Sin}x}{\mathrm{Cos}x-\mathrm{Cos}^2x} =$

1) 0 2) 1 3) $\frac{2}{3}$ 4) 4

14. $\underset{x\to 0}{Lt}\frac{3\sin x-\sin 3x}{x.\tan^2 2x} =$

1) 0 2)1 3) 2 4) 4

15. $\underset{x\to\frac{1}{\sqrt{2}}}{Lt}\frac{x-\cos(\sin^{-1}x)}{1-\tan(\sin^{-1}x)} =$

1) $\frac{1}{2}$ 2) e^2 3) $-\frac{1}{\sqrt{2}}$ 4) 1

16. $\underset{x\to 0}{Lt}\dfrac{\sin x - x + \dfrac{x^3}{6}}{x^5} =$

1) $\dfrac{1}{140}$ 2) $\dfrac{1}{5}$ 3) $\dfrac{1}{60}$ 4) $\dfrac{1}{120}$

17. $\underset{x\to 0}{Lt}\dfrac{Secx - 1}{x^2(Secx+1)^2} =$

1) $\dfrac{1}{8}$ 2) $\dfrac{1}{4}$ 3) 2 4) 0

18. $\underset{x\to 0}{Lt}\dfrac{mSinmx - nSinnx}{\tan mx + \tan nx} =$

1) m-n 2) m+n 3) $m^2 - n^2$ 4) 0

19. $\underset{x\to 1}{Lt}\dfrac{1+\cos \pi x}{\tan^2 \pi x} =$

1) 1 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{3}$ 4) -1

20. $\underset{x\to \frac{\pi}{4}}{Lt}\dfrac{\sqrt{2} - Cosx - Sinx}{(4x-\pi)^2} =$

1) $\dfrac{1}{16\sqrt{2}}$ 2) $\dfrac{1}{32\sqrt{2}}$ 3) $\dfrac{1}{16}$ 4) $\dfrac{1}{8}$

21. $\underset{x\to 0}{Lt}\dfrac{\tan^4 x - \sin^4 x}{x^6} =$

1) 2 2) $\dfrac{1}{6}$ 3) $\dfrac{2}{3}$ 4) $\dfrac{3}{2}$

22. $\underset{x\to 0}{Lt}\dfrac{x(1-\sqrt{1-x^2})}{\sqrt{1-x^2}.(\sin^{-1}x)^3} =$

1) 1 2) -1 3) $\dfrac{1}{2}$ 4) 0

23. $\underset{x\to 0}{Lt}\dfrac{8}{x^8}\left(1-\cos\dfrac{x^2}{2}-\cos\dfrac{x^2}{4}+\cos\dfrac{x^2}{2}.\cos\dfrac{x^2}{4}\right)=$

1) $\dfrac{1}{16}$ 2) $\dfrac{1}{15}$ 3) $\dfrac{1}{32}$ 4) 1

24. If $f(x) = \dfrac{\sin[x]}{[x]}$, [x] $\neq 0$ = 0 if [x] = 0 then

$\underset{x\to 0}{lt} f(x) =$

1) 0 2) sin 1

3) 1 4) does not exist

25. $\underset{x\to 0}{Lt}\left\{\dfrac{\int_0^x Sin^2 x\, dx}{x^3}\right\} =$

1) $\dfrac{1}{2}$ 2) $\dfrac{1}{3}$ 3) $\dfrac{1}{4}$ 4) $\dfrac{2}{3}$

26. $\underset{x\to -1^+}{Lt}\dfrac{\sqrt{\pi}-\sqrt{\cos^{-1}x}}{\sqrt{x+1}} =$

1) $\dfrac{1}{\sqrt{2\pi}}$ 2) $\dfrac{1}{2\sqrt{\pi}}$ 3) $\dfrac{1}{\pi\sqrt{2}}$ 4) $\dfrac{2}{\sqrt{\pi}}$

27. $\underset{x\to \frac{\pi}{4}}{Lt}\dfrac{\sqrt{2}\cos x - 1}{\cot x - 1}$

1) 1 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{\sqrt{2}}$ 4) $\dfrac{1}{2\sqrt{2}}$

28. Let α and β be the roots of $ax^2 + bx + c = 0$,

then $\underset{x\to\alpha}{Lt}\dfrac{1-\cos(ax^2+bx+c)}{(x-\alpha)^2} =$

1) $\dfrac{a^2(\alpha-\beta)^2}{2}$ 2) $\dfrac{a^2}{2(\alpha-\beta)^2}$

3) $\dfrac{a^2}{(\alpha-\beta)^2}$ 4) $-\dfrac{a^2}{2(\alpha-\beta)^2}$

29. If $f(x) = \dfrac{\tan x}{\sqrt{1+\tan^2 x}}$, $\underset{x\to(\pi/2)^-}{Lt} f(x) = a$ and

$\underset{x\to(\pi/2)^+}{Lt} f(x) = b$ then

1) a = b 2) a = 1 + b

3) a + b = 0 4) a+b=2

30. $\underset{x\to o}{Lt}\dfrac{\sqrt{\frac{1}{2}(1-\cos x)}}{x} =$

1) 1 2) –1

3) 0 4) does not exist

31. $\underset{x\to 0}{Lt}\dfrac{1-\cos 2x^3}{x^2.\tan^2 3x \sin^2 4x} =$

1) $\dfrac{1}{72}$ 2) $\dfrac{1}{48}$ 3) $\dfrac{1}{24}$ 4) 1

32. $\underset{n\to\infty}{Lt}\dfrac{(2n+1)^4-(n-1)^4}{(2n+1)^4+(n-1)^4}=$

1) $\dfrac{15}{17}$ 2) $\dfrac{17}{15}$ 3) 0 4) ∞

33. $\underset{n\to\infty}{Lt}\dfrac{\left(\sqrt{n^2+1}+n\right)^2}{\sqrt[3]{n^6+1}}=$

1) 1 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{3}$ 4) 4

34. $\underset{n\to\infty}{Lt}\dfrac{2.3^{n+1}-3.5^{n+1}}{2.3^n+3.5^n}=$

1) 5 2) $\dfrac{1}{5}$ 3) -5 4) 0

35. $\underset{n\to\infty}{Lt}\dfrac{1^3+2^3+3^3+....+n^3}{3n^4+5n^3+6}=$

1) $\dfrac{1}{3}$ 2) $\dfrac{1}{5}$ 3) $\dfrac{1}{6}$ 4) $\dfrac{1}{12}$

36. $\underset{x\to\infty}{Lt}$ x[log(x+a)-logx]=

1) e^2 2) e^a 3) a 4) $\dfrac{1}{a}$

37. $\underset{x\to\infty}{Lt}\left(\cos\sqrt{x+1}-\cos\sqrt{x}\right)=$

1) 1 2) -1 3) $\dfrac{1}{3}$ 4) 0

38. $\underset{x\to\infty}{Lt}\dfrac{3.\sqrt{x}+5\sin^2 x-10.\log x}{5.\sqrt{x}+7\cos^2 x+100.\log x}=$

1) $\dfrac{3}{5}$ 2) $\dfrac{5}{3}$ 3) 15 4) $\dfrac{1}{15}$

39. $\underset{x\to 0}{Lt}(\cos x)^{\frac{1}{x^2}}=$

1) $\dfrac{-1}{2\sqrt{e}}$ 2) ∞ 3) $\sqrt{e}$ 4) $\dfrac{1}{\sqrt{e}}$

40. $\underset{x\to a}{Lt}\left(\dfrac{Sinx}{Sina}\right)^{\frac{1}{x-a}}=$

1) $e^{\cos a}$ 2) $e^{\cot a}$ 3) $e^{\sin a}$ 4) $e^{\tan a}$

41. $\underset{x\to 0}{Lt}\left(\dfrac{a^x+b^x}{2}\right)^{\frac{1}{x}}=$

1) ab 2) $\dfrac{1}{ab}$ 3) a^2b^2 4) $\sqrt{ab}$

42. $\underset{x\to 0}{Lt}(\cos x)^{\frac{1}{Sinx}}=$

1) 1 2) -1 3) 0 4) 3

43. If a = $\underset{x\to\infty}{lt}\left(\sqrt{x+\sqrt{x}}-\sqrt{x}\right)$ and

b = $\underset{x\to\infty}{lt}\left(x-\sqrt{x+x^2}\right)$ then

1) a + b = 1 2) a + b = 0

3) a = b 4) a + b = 2

44. If f(x) = $\dfrac{4-7x}{7x+4}$, $\underset{x\to 0}{Lt}$ f(x) = l and

$\underset{x\to\infty}{Lt} f(x)=m$ the quadratic equation having

roots as $\dfrac{1}{l}$ and $\dfrac{1}{m}$ is

1) $x^2-1=0$ 2) $x^2+1=0$

3) $\dfrac{1}{2}$ 4) $x^3-1=0$

45. $\underset{x\to\infty}{lt}\dfrac{x^4.\sin\left(\dfrac{1}{x}\right)+x^2}{1+|x|^3}=$

1) 0 2) 1

3) -1 4) does not exist

46. $\underset{x\to\infty}{Lt}\, x\left(a^{\frac{1}{x}}-b^{\frac{1}{x}}\right)=$

1) 1 2) $\log_e$ a/b 3) $\log_e$ b/c 4) 0

47. $\underset{x\to\infty}{Lt}\left(\dfrac{x^2+5x+3}{x^2+x+2}\right)^x$

1) e^4 2) e^3 3) e^2 4) 2^4

48. If 0 < x < y than $\underset{n\to\infty}{Lt}\left(y^n+x^n\right)^{\frac{1}{n}}=$

1) 1 2) x 3) y 4) e

49. $\underset{n\to\infty}{Lt}\, n\cos\left(\dfrac{\pi}{n}\right)\sin\left(\dfrac{2\pi}{3n}\right)=$

1) $\dfrac{2\pi}{3}$ 2) 1 3) π 4) 0

50. $\underset{n\to\infty}{Lt}\frac{1.1!+2.2!+3.3!+...+n.n!}{(n+1)!}=$

1) -1 2) 1 3) 1/2 4) 2

51. $\underset{x\to 0}{Lt}\frac{(4^x-1)^3}{\sin\left(\frac{x}{4}\right)\log\left(1+\frac{x^2}{3}\right)}=$

1) $3(\log 4)^3$ 2) $4(\log 4)^3$
3) $12(\log 4)^3$ 4) $15(\log 4)^3$

52. $\underset{x\to 0}{Lt}\left(1+\tan^2\sqrt{x}\right)^{\frac{1}{2x}}$

1) e 2) $\frac{1}{2}$
3) $e^{\frac{1}{2}}$ 4) 0

53. $\underset{x\to 0}{Lt}\left\{\tan\left(\pi/4+x\right)\right\}^{\frac{1}{x}}=$

1) e 2) e^2 3) e^{-1} 4) e^{-2}

54. $\underset{n\to\infty}{Lt}\frac{1+3+6+.......+\frac{n(n+1)}{2}}{n^3}=$

1) $\frac{1}{6}$ 2) $\frac{1}{3}$ 3) $\frac{1}{4}$ 4) $\frac{1}{2}$

55. $\underset{n\to\infty}{Lt}\frac{n(1^2+2^2+3^2+....+n^2)^5}{(1^3+2^3+3^3+....+n^3)^4}=$

1) $\frac{256}{243}$ 2) $\frac{4^4}{6^5}$ 3) $\frac{243}{256}$ 4) ∞

56. $\underset{n\to\infty}{Lt}\frac{n+(-1)^n}{n-(-1)^n}=$

1) 0 2) -1 3) 1 4) $\frac{1}{2}$

57. $\underset{n\to\infty}{Lt}\frac{{}^nP_n}{{}^{n+1}P_{n+1}-{}^nP_n}=$

1) 1 2) -1 3) 0 4) ∞

58. If $\underset{x\to\infty}{Lt}\left(\frac{x+h}{x-h}\right)^x=4,$ then h =

1) $\log_e 2$ 2) $\log_{10} 2$ 3) $\log_2 e$ 4) $\log_2 10$

59. The value of f(0) so that the function f(x)= $\frac{\sqrt{1+x}-\sqrt[3]{1+x}}{x}$ becomes continuous is equal to

1) $\frac{1}{6}$ 2) $\frac{1}{4}$ 3) 2 4) $\frac{1}{3}$

60. If f(x)=. $\frac{1}{3^{\frac{1}{x}}+1}$ then at x=0,f(x) is

1)continuous 2)discontinuous
3)not determined 4) $\underset{x\to 0}{Lt}f(x)=2$

61. The function f(x)= $\frac{1-\sin x}{(\pi-2x)^2}$ for x $\neq\frac{\pi}{2}$

=k for x= $\frac{\pi}{2}$ is continuous at x= $\frac{\pi}{2}$ then k is equal to

1) $\frac{1}{8}$ 2) 4 3)3 4)1

62. $\underset{x\to 0}{Lt}\frac{\sin 2x+a\sin x}{x^3}$ exists and finite then a =

1) 2 2) -2 3) $\frac{2}{3}$ 4) $\frac{-2}{3}$

63. $$f(x)=\begin{cases}\frac{\left(x+bx^2\right)^{1/2}-x^{1/2}}{bx^{3/2}}, & x>0\\ C, & x=0\\ \frac{Sin(a+1)x+\sin x}{x}, & x<0\end{cases}$$

is continuous at x = 0 then

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

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

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

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

64. $\lim_{x\to 0}\frac{(1+a^3)+8e^{1/x}}{1+(1-b^3)e^{1/x}}=2$ then

1) a =1, b = $(-3)^{1/3}$ 2) a= 1, b = $3^{1/}$
3) a = –1, b = $(-3)^{1/3}$ 4) a=1, b=0

65. $\lim_{x\to 0}\frac{\log(1+x+x^2)+\log(1-x+x^2)}{\sec x-\cos x}=$

1) 1 2) – 1 3) 0 4) ∞

66. $\lim_{x\to\frac{\pi}{4}}\frac{\sqrt{1-\sqrt{\sin 2x}}}{\pi-4x}=$

1) – 1/4 2) 1/2
3) 1/4 4) does not exist

67. $\lim_{x\to\infty}\frac{2\sqrt{x}+3\sqrt[3]{x}+5\sqrt[5]{x}}{\sqrt{3x-2}+\sqrt[3]{2x-3}}=$

1) $\frac{2}{\sqrt{3}}$ 2) $\sqrt{3}$ 3) $\frac{1}{\sqrt{3}}$ 4) $\frac{\sqrt{3}}{2}$

68. If α is a repeated root of $ax^2 + bx + c = 0$ then

$\lim_{x\to\alpha}\frac{\tan(ax^2+bx+c)}{(x-\alpha)^2}=$

1) a 2) b 3) c 4) 0

69. $\lim_{x\to a}\frac{a^x-x^a}{x^x-a^a}=-1$ then $a=$

1) 1 2) log a 3) - log a 4) 2

70 If $f^1(0)=3$, $\lim_{x\to 0}\frac{x^2}{f(x^2)-6f(4x^2)+5f(7x^2)}=$

1) $\frac{1}{36}$ 2) $-\frac{1}{36}$ 3) $\frac{1}{34}$ 4) $\frac{1}{106}$

71. $\lim_{x\to 1}\frac{Px^2+Ex+r}{x-1}=0,$ then

1) $P=E=r$ 2) $P=r=-\frac{E}{2}$
3) $2P=2r=E$ 4) $P=r=E$

72. If $\lim_{x\to\infty}\left[1+x+\frac{f(x)}{x}\right]^{\frac{1}{x}}=e^3$ then the value of the function $f(x)$ may be

1) $\frac{x^2}{2}$ 2) x^2 3) $2x^2$ 4) $3x^2$

73 $f(x)=\min\{x,x^2\}\ \forall x\in R$. Then $f(x)$ is

1) discontinuous at 0 2) discontinuous at 1
3) continuous on R 4) continuous at 0, 1

74. If $f(x)=\frac{\sin 3(x-p)}{\sin 2(x-p)}, x\neq p$ is continuous at $x=p$ then $f(p)=$

1) 1 2) 0 3) $\frac{2}{3}$ 4) $\frac{3}{2}$

75 If $f(x)=\frac{|x|}{[x]}$ and $x\notin[0,1]$ then

$\lim_{x\to 2+}\frac{f(x)-f(2)}{x-2}=$

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) 1 4) 0

76. If $f(x)$ is differntiable function and where $f'(1)=4$, $f'(2)=6$ $f'(c)$ means the deriva tive of f at c then

$\lim_{h\to 0}\frac{f(2+2h+h^2)-f(2)}{f(1+h-h^2)-f(1)}$

1) does not exist 2) -3
3) 3 4) $\frac{3}{2}$

77 $\lim_{x\to 0}\frac{1-\cos(1-\cos x)}{x^4}=$

1) $\frac{1}{8}$ 2) $\frac{1}{2}$ 3) $\frac{1}{4}$ 4) 1

78. $\lim_{x\to 0}\frac{\sin^{-1}x+3x}{\tan x+2\sin\left(\frac{1}{2}\sin^{-1}x\right)\left(3-4\sin^2\left(\frac{1}{2}\sin^{-1}x\right)\right)}=$

1) -1 2) 1 3) 0 4) 2

79. $\lim_{x\to 2}\frac{\sqrt{x+7}-3\sqrt{2x-3}}{\sqrt[3]{x+6}-2\sqrt[3]{3x-5}}=$

1) $\frac{34}{23}$ 2) $\frac{23}{17}$ 3) $\frac{7}{23}$ 4) $\frac{23}{7}$

80. $\underset{n\to\infty}{Lim}\dfrac{(2n-1)(3n+5)}{(n-1)(3n+1)(3^n+2^n)}=$

1) 2 2) ∞ 3) 0 4) 1

81. The value of P for which the function $f(x)=$

$\dfrac{(4^x-1)^3}{\sin\dfrac{x}{p}.\log\left(1+\dfrac{x^2}{3}\right)}$ for $x\neq 0$

$=12(\log 4)^3$ for $x=0$

is continuous at $x=0$, is

1) 4 2) 2 3) 3 4) 1

82. The value of f(0) so that the function f(x)

$=\dfrac{1-\cos(1-\cos x)}{x^4}$ is continuous everywhere is

1) $\dfrac{1}{8}$ 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{4}$ 4) $\dfrac{1}{3}$

KEY

1) 3	2) 2	3) 4	4) 1	5)2
6) 3	7) 1	8) 2	9) 4	10)4
11) 1	12) 2	13) 4	14) 2	15) 3
16) 4	17) 1	18) 1	19) 2	20) 1
21) 1	22) 3	23) 3	24) 4	25) 2
26) 1	27) 2	28) 1	29) 3	30) 4
31) 1	32) 1	33) 4	34) 3	35) 3
36) 3	37) 4	38)1	39) 4	40) 2
41) 4	42) 2	43) 2	44) 1	45) 2
46) 2	47) 1	48) 3	49) 1	50) 1
51) 3	52) 3	53) 2	54) 1	55) 1
56) 3	57) 3	58) 1	59) 1	60) 2
61) 1	62) 2	63) 2	64) 1	65) 1
66) 4	67) 1	68) 1	69) 1	70) 1
71)2	72) 3	73) 3	74) 4	75) 2
76.3	77.1	78.2	79.1	80.3
81.1	82.1			

HINTS

23. Put $\dfrac{x^2}{4}=a$

21. $\underset{x\to 0}{Lt}\dfrac{\tan^4 x}{x^4}\left(\dfrac{1-\cos^4 x}{x^2}\right)$

24. $\underset{x\to 0+}{Lt}\dfrac{\sin[x]}{[x]}=1$; $\underset{x\to 0-}{Lt}\dfrac{\sin[x]}{[x]}=\sin 1$

25. $\dfrac{d}{dx}\left(\displaystyle\int_{\psi(x)}^{\psi(x)} f(t)dt\right)=f(\psi(x))\psi'(x)-f(\phi(x))\phi'(x)$.

28. $\underset{x\to\alpha}{Lt}\dfrac{1-\cos[a(x-\alpha)(x-\beta)]}{(x-\alpha)^2}$ and apply

$\dfrac{1-\cos ax}{x^2}=\dfrac{a^2}{2}$

34. Divide Nr. and Dr. by 5^n

66. $\underset{x\to 0}{Lt}\dfrac{|\sin x|}{x}$ does not exists

72. $\underset{x\to\infty}{Lt}\left[1+x(1+k)\right]^{1/x}=e^{k+1}$

LEVEL - III

1. $\underset{n\to\infty}{Lt}\dfrac{1}{n^4}\displaystyle\sum_{r=1}^{n} r(r+2)(r+4)=$

1) $\frac{3}{4}$ 2) 0 3) $\frac{1}{8}$ 4) $\frac{1}{4}$

2. $\underset{x\to 0}{Lt}\dfrac{e^{x^3}-1-x^3}{\sin^6(2x)}=$

1) $\frac{1}{128}$ 2) $\frac{2}{127}$ 3) $\frac{1}{126}$ 4) $\frac{1}{125}$

3. $\underset{n\to\infty}{Lt}\log\left(\displaystyle\prod_{r=1}^{n}\frac{1}{5^{2^r}}\right)=$

1) $\log_e 5$ 2) $\log_5 e$ 3) 0 4) $2\log_e 5$

4. $\underset{n\to\infty}{Lim}\left[\dfrac{7}{10}+\dfrac{29}{10^2}+\dfrac{133}{10^3}+........+\dfrac{5^n+2^n}{10^n}\right]=$

1) $\dfrac{3}{4}$ 2) 2 3) $\dfrac{5}{4}$ 4) $\dfrac{1}{2}$

5. $\underset{x\to 0}{Lt}\dfrac{(1+x)^{1/x}-e}{x}=$

1) 1 2) e/2 3) –e/2 4) 2/e

6. Suppose f(n+1) $=\frac{1}{2}\left\{f(n)+\frac{9}{f(n)}\right\}, n \in N$. If $f(n)>0, \forall n \in N$, then $\underset{n\to\infty}{Lt}(f(n))=$

1) 3^{-1} 2) -3^{-1} 3) 3 4) –3

7. If |x|<1, then $\underset{n\to\infty}{Lt}(1+x)\left(1+x^2\right)\left(1+x^4\right).....\left(1+x^{2n}\right)=$

1) $\frac{1}{x}$ 2) $\frac{1}{1+x}$ 3) $\frac{1}{1-x}$ 4) $\frac{1}{x-1}$

8. If $a_1 = 1$ and $a_{n+1}=\frac{4+3a_n}{3+2a_n}$, then $\underset{n\to\infty}{Lt}\, a_n=$

1) 0 2) –2 3) $\sqrt{2}$ 4) $-\sqrt{2}$

9. $\underset{x\to\infty}{Lt}\left(\frac{x^2+2x-1}{2x^2-3x-2}\right)^{\frac{2x+1}{2x-1}}=$

1) $-\frac{1}{2}$ 2) $\frac{1}{2}$ 3) $e^{-\frac{1}{2}}$ 4)

10. $\underset{n\to\infty}{Lt}\frac{\sin\left(\frac{a}{2^n}\right)}{\sin\left(\frac{b}{2^{n+1}}\right)}=$

1) $\frac{a}{2b}$ 2) $\frac{2a}{b}$ 3) 1 4) 0

11. $\underset{x\to 0}{Lt}\left[\frac{\log_{\sec\left[\frac{x}{2}\right]}\cos x}{\log_{\sec x}\cos\left(x/2\right)}\right]=$

1) 14 2) 15 3) 16 4) 17

12. $\underset{x\to\frac{\pi}{2}}{Lt}\frac{1-(\sin x)^{\sin x}}{\cos^2 x}=$

1) 2 2) 1 3) $\frac{1}{2}$ 4) $\frac{1}{4}$

13. The set of points of discontinuity of $f(x)=\underset{x\to\infty}{Lt}\frac{(2\sin x)^{2n}}{3^n-(2\cos x)^{2n}}$ is

1) $\{n\pi / n\in Z\}$ 2) $\left\{n\pi\pm\frac{\pi}{6} / n\in Z\right\}$

3) $\left\{n\pi\pm\frac{\pi}{2} / n\in Z\right\}$ 4) $\left\{n\pi\pm\frac{\pi}{3} / n\in Z\right\}$

14. $\underset{x\to 0}{Lt}\left[\frac{x-1+\sin x}{x}\right]^{\frac{1}{x}}=$

1) 1 2) 0 3) $e^{-1/2}$ 4) $e^{1/2}$

15. $\underset{x\to o}{Lt}\frac{x\sin(\sin x)}{1-\cos x}=$

1) 1 2) 2 3) 4 4) 0

16. If [x] denotes the greatest integer less than or equal to x then

$\underset{n\to\infty}{Lt}\frac{1}{n^3}\left\{\left[1^2x\right]+\left[2^2x\right]+\left[3^2x\right]+......+\left[n^2x\right]\right\}=$

1) $\frac{x}{2}$ 2) $\frac{x}{3}$ 3) $\frac{x}{6}$ 4) 0

17. $\underset{x\to\infty}{Lim}\frac{[x]+[2x]+....+[nx]}{n^2}=$

1) x/2 2) x/3

3) x 4) 0

18. $\underset{x\to 0}{Lt}\frac{\tan\left[-\pi^2\right]x^2-\tan\left[-\pi^2\right]x^2}{\sin^2 x}$ where [.] is the greatest integer function

1) $\tan 10-10$ 2) $\tan^2 10-20$

3) $\tan 10$ 4) 0

19. $\underset{x\to -1}{Lim}\frac{\cos 2-\cos x}{x^2-|x|}=$

1) 2sin 2 2) sin 2

3) 2 cos2 4) does not exists

20. $\underset{n\to\infty}{Lim}\, n^2\left\{\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\sqrt{\left(1-\cos\frac{1}{n}\right)\text{———}\infty}}}\right\}=$

1) 1/4 2) 1/3 4) 1/2 4) 1

21. $\underset{x\to 1}{Lim}\left[\frac{x^3+2x^2+x+1}{x^2+2x+3}\right]^{\frac{1-\cos(x-1)}{(x-1)^2}} =$

1) e 2) $e^{1/2}$ 3) 1 4) $\left(\frac{5}{6}\right)^{1/2}$

22. The value of $\underset{x\to\infty}{Lim}\cos\left(\frac{x}{2}\right)\cos\left(\frac{x}{4}\right)\cos\left(\frac{x}{8}\right)----\cos\left(\frac{x}{2^n}\right)=$

1) 1 2) $\frac{\sin x}{x}$ 3) $\frac{x}{\sin x}$ 4) 2

23. $\underset{x\to 0}{Lim}\left(\frac{\sin x}{x}\right)^{\frac{\sin x}{x-\sin x}} =$

1) e 2) e^2
3) e^3 4) 1/e

24. $\underset{x\to\infty}{Lim}\left(1+e^{-x}\right)^{e^x} =$

1) e 2) e^2
3) e^3 4) 1/e

25. $\underset{x\to\infty}{Lim}\left\{\sqrt{x^2-\sqrt{x^4+1}}-\sqrt{2}x\right\}$

1) 0 2) 1 3) 2 4) 4

26. $\underset{x\to\infty}{Lim}\frac{1-2+3-4+5-6+.....-2n}{\sqrt{n^2+1}+\sqrt{4n^2-1}} =$

1) $\frac{1}{3}$ 2) $-\frac{1}{3}$ 3) $-\frac{1}{5}$ 4) $\frac{1}{5}$

27. $\underset{n\to\infty}{Lim}\left\{\log_{n-1}^{n}.\log_{n}^{n+1}.\log_{n+1}^{n+2}.............\log_{n^k-1}^{n^k}\right\} =$

1) 2n 2) n 3) k 4) 2k

28. $f(x)=\begin{vmatrix}2\cos x & x & 1\\ 2\sin x & x^2 & 2x\\ \tan x & x & 1\end{vmatrix}$ then $\underset{x\to 0}{Lim}\frac{f'(x)}{x}=$

1) 1 2) – 1 3) 2 4) – 2

29. $f(x)=\begin{vmatrix}\cos x & 1 & 0\\ 1 & 2\cos x & 1\\ 0 & 1 & 2\cos x\end{vmatrix}$ then $\underset{x\to 0}{Lim}f(x)=$

1) 0 2) 1 3) 2 4) 3

30. If $a=\min\left\{x^2+4x+5, x\in R\right\}$ and $b=\underset{\theta\to 0}{Lim}\frac{1-\cos 2\theta}{\theta^2}$ then the value of $\sum_{r=0}^{n}a^r b^{n-r} =$

1) $\frac{2^{n+1}-1}{4.2^n}$ 2) $2^{n+1}-1$

3) $\frac{2^{n+1}-1}{3.2^n}$ 4) 2^n-1

31. $\underset{x\to 1}{Lim}\left(\log_2 2x\right)^{\log_x 5} =$

1) $e^{\log_5 2}$ 2) $e^{\log_2 5}$ 3) e^5 4) e^2

32. If $f(x)=\frac{\sqrt{a^2-ax+x^2}-\sqrt{a^2+ax+x^2}}{\sqrt{a+x}-\sqrt{a-x}}$ is continuous at $x=0$ then $f(0)=$

1) $\sqrt{a}$ 2) $-\sqrt{a}$ 3) $a\sqrt{a}$ 4) $-a\sqrt{a}$

33. If $f(x)=\begin{cases}x^{\alpha}\cos(1/x), & x\neq 0\\ 0, & x=0\end{cases}$ is continuous at $x=0$ then

1) $\alpha<0$ 2) $\alpha>0$ 3) $\alpha=0$ 4) $\alpha\geq 0$

34. The graph of $y=f(x)$ has unique tangent at the point $(a,0)$ through which the graph passes. Then $\underset{x\to a}{Lim}\frac{\log\left[1+6f(x)\right]}{3f(x)}=$

1) 0 2) 1 3) 2 4 ∞

35. $\underset{x\to 0}{Lim}\frac{\sin(1+x)-\sin(1-x)}{x}=$

1) 2 2) 2 cos1 3) cos 2 4) 0

KEY

1) 4	2) 1	3) 1	4) 3	5) 3
6) 3	7) 3	8) 3	9) 2	10) 2
11) 3	12) 3	13) 2	14) 3	15) 2
16) 2	17) 1	18) 1	19) 1	20) 4
21) 4	22) 2	23) 4	24) 1	25) 1
26) 2	27) 3	28) 4	29) 2	30) 2
31) 2	32) 2	33) 2	34) 3	35) 2

HINTS

1. $\underset{x\to\infty}{Lt}\frac{\Sigma n^m}{n^{m+1}}=\frac{1}{m+1}$

3. $\underset{x\to 0}{Lt}\log\left(5^{\frac{1}{2}}\times 5^{\frac{1}{4}}\times..........\right)=\log_e 5$

8. If $a_n=1,\ Lt\left(a_n+1\right)=1,\ Lt\left(a_n\right)=1$

15. Use formula $\underset{x\to 0}{Lt}\frac{1-\cos ax}{x^2}=\frac{a^2}{2}$

LEVEL- IV

1. Assertion : If |x| < 1 then

$\underset{n\to\infty}{Lim}(1+x)(1+x^2)(1+x^4)......(1+x^{2n})=\frac{1}{1-x}$

Reason : $(1+x)(1+x^2)......=\frac{1-x^{2n+1}}{1-x}$

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) R is true but A is false

2. Assertion : $\underset{x\to\infty}{Lim}\left(\frac{x^2+5x+3}{x^2+x+2}\right)^x=e^4$

Reason : $\underset{x\to\infty}{Lim}(1+x)^{1/x}=e$

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) R is true but A is false

3. Assertion : $f(x)=\begin{cases}x^2\sin\left(\frac{1}{x}\right), & x\neq 0\\ 0, & x=0\end{cases}$ is continuous at x = 0

Reason : Both

$h(x)=x^2,\ g(x)=\begin{cases}\sin\left(\frac{1}{x}\right), & x\neq 0\\ 0, & x=0\end{cases}$ are continuous at x = 0

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false 4) R is true but A is false

4. Assertion : $f(x)=\frac{\sin\{[x]\pi\}}{1+x^2}$ is continuous on R.

Reason : Every constant function is continuous on R

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) R is true but A is false

5. Assertion : $f(x)=x\left(\frac{1+e^{1/x}}{1-e^{1/x}}\right)(x\neq 0)$, f(0) = 0 is continuous at x = 0.

Reason : A function is said to be continuous at 'a' if both limits are exists and equal to f(a).

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true and R is not the correct explanation of A
3) A is true but R is false
4) R is true but A is false

6.

List - I	List - II
a) $\underset{x\to 0}{Lim}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$	1) $e^{\frac{-1}{6}}$
b) $\underset{x\to 0}{Lim}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}$	2) $e^{\frac{1}{3}}$
c) $\underset{x\to 0}{Lim}(\cos x)^{\frac{1}{\tan x}}$	3) $e^{\frac{2}{\pi}}$
d) $\underset{x\to 0}{Lim}\left(2-\frac{x}{a}\right)^{Tan\left(\frac{\pi x}{2a}\right)}$	4) 1

Then the correct match for List - I from List - II

	a	b	c	d
1)	1	4	3	2
2)	1	2	3	4
3)	2	1	4	3
4)	1	2	4	3

7. List - I　　　　　　　　List - II

a) f(x) = [x] is continuous on　　1) R

b) f(x) = |x| is continuous on　　2) R - Z

c) $f(x)=\frac{|x-2|}{x-2}$ is continuous on　　3) R – {2}

Then the correct match for List - I from List - II

	a	b	c
1)	1	2	3
2)	1	3	2
3)	2	1	3
4)	2	3	1

8. If m, n are +ve integers and $a_0, b_0 \neq 0$ are non-zero real numbers

$$\underset{n\to\infty}{Lim}\frac{a_0x^m+a_1x^{m-1}+........+a_{m-1}x+a_m}{b_0x^n+b_1x^{n-1}+..........+b_{n-1}x+bn_n}$$

List - I　　　　　　　　List - II

a) m = n　　1) $\frac{a_0}{b_0}$

b) m < n　　2) ∞

c) m > n　　3) 0

Then the correct match for List - I from List - II

	a	b	c
1)	1	2	3
2)	1	3	2
3)	2	1	3
4)	1	3	3

9. Mathc the following :

List - I　　　　　　**List - II**

a) The no.of points of discontinuity of the function $f(x)=\frac{1}{\log|x|}$ is　　1) 0

b) If f(x) = $(x+1)^{\text{cosecx}}$ is continuous at x = 0 then f(0) =　　2) 3

c) $f(x)=\frac{\cos x-\sin x}{\cos 2x}$, $x\neq\frac{\pi}{4}$ If is continuous on $\left[0,\frac{\pi}{4}\right]$ then $f\left(\frac{\pi}{4}\right)=$　　3) 1

d) If $f(x)=\frac{\sqrt{1+\sin x}-\sqrt{1-\sin x}}{x}$ is continuous everywhere then f(0) =　　4) e

　　5) $\frac{1}{\sqrt{2}}$

Then the correct match for List - I from List - II

	a	b	c	d
1)	1	2	3	4
2)	4	3	1	2
3)	2	4	5	3
4)	2	4	1	5

10. Match the following :

A) $\underset{x\to\infty}{Lim}\left(\frac{a^{1/x}+b^{1/x}+c^{1/x}}{3}\right)^{1/x}=$　　1) 1/2

B) $\underset{x\to 5}{Lim}\frac{x^2-9x+20}{x-[x]}=$　　2) –1

C) $\underset{x\to 0}{Lim}\frac{1-e^{1/x^2}}{1+e^{1/x^2}}=$　　3) does not exist

D) $\underset{n\to\infty}{Lim}\frac{2.3^n+5.2^n}{4.3^n-7.2^n}=$　　4) $(abc)^{1/3}$

	A	B	C	D
1)	1	2	3	4
2)	4	3	3	1
3)	4	3	2	1
4)	4	3	1	2

11. I : $\underset{n\to\infty}{Lim}\frac{n!}{(n+1)!-n!}=0$

II : $\underset{x\to 0}{Lim}\sqrt{\frac{x-\sin^2 x}{x+\cos x}}=1$

1) Only I is true 2) Only II is true
3) Both I and II are true
4) Neither I nor II is true

12. I : If a > 0 then $\underset{x\to\infty}{Lim}\frac{[ax+b]}{x}=a$

II : $\underset{x\to\frac{\pi}{2}}{Lim}[\sin x]=0$

1) Only I is true 2) Only II is true
3) Both I and II are true
4) Neither I nor II is true

13. I : $\underset{n\to\infty}{Lim}\frac{1+3+6+......+\frac{n(n+1)}{2}}{n^3}=\frac{1}{6}$

II : $\underset{n\to\infty}{Lim}\frac{1.1!+2.2!+3.3.!+.......+n.n!}{(n+1)!}=1$

1) Only I is true 2) Only II is true
3) Both I and II are true
4) Neither I nor II is true

14. I : $\underset{x\to 0}{Lim}\left(\frac{\tan[e^2]x^2-\tan[-e^2]x^2}{\sin^2 x}\right)=15$

II : $\underset{x\to 0}{Lim}\left(\frac{1^x+2^x+3^x+......+n^x}{n}\right)^{\frac{1}{x}}=(n!)^{1/n}$

1) Only I is true 2) Only II is true
3) Both I and II are true
4) Neither I nor II is true

15. I : $\underset{\theta\to 0}{Lim}\left(\left[\frac{n.\sin\theta}{\theta}\right]+\left[\frac{n\tan\theta}{\theta}\right]\right)=$ even integer

where [.] denotes the greatest integer function.

II : $\underset{x\to 0}{Lim}\frac{ae^x-b}{x}=2$ then a =2, b =2

1) Only I is true
2) Only II is true
3) Both I and II are true
4) Neither I nor II is true

16. Arrange the following limits in ascending order

a) $\underset{x\to 0}{Lim}\frac{\sin x^0}{x}$

b) $\underset{x\to 0}{Lim}\frac{3\sin x^0-\sin 3x^0}{x^3}$

c) $\underset{x\to 0}{Lim}\frac{\tan x^0}{2x}$

d) $\underset{x\to 0}{Lim}\frac{(\sec x^0+1)(\sec x^0-1)}{x^2}$

1) b,d,c,a 2) b,c,a,d 3) b,c,d,a 4) b,a,d,c

17. Arrange the following limits in the ascending ordr.

a) $\underset{x\to 0}{Lim}\frac{\tan^4 x-\sin^4 x}{x^6}$

b) $\underset{x\to 0}{Lim}\frac{\tan^8 x-\sin^8 x}{x^5\tan x^5 x}$

c) $\underset{x\to 0}{Lim}\frac{\tan^3 x-\sin^3 x}{x\sin^4 x}$

d) $\underset{x\to 0}{Lim}\frac{\tan^5 x-\sin^5 x}{x^2.\sinh^3 x.\tan^2 x}$

1) a,b,a,d 2) c,a,d,b 3) a,b,d,c 4) b,a,c,d

18. Arrange the following limits in the ascending order

a) $\underset{x\to 0}{Lim}\left(\frac{1^x+2^x+4^x}{3}\right)^{\frac{1}{x}}$

b) $\underset{x\to 0}{Lim}\left(\frac{2^x+3^x+8^x+27^x}{4}\right)^{\frac{1}{x}}$

c) $\underset{x\to 0}{Lim}\left(\frac{1^x+\left(\frac{1}{2}\right)^x+\left(\frac{1}{4}\right)^x}{3}\right)^{\frac{1}{x}}$

d) $\underset{x\to 0}{Lim}\left(\frac{\left(\frac{1}{2}\right)^x+\left(\frac{1}{3}\right)^x+\left(\frac{1}{8}\right)^x+\left(\frac{1}{27}\right)^x}{4}\right)^{\frac{1}{x}}$

1) d,c,a,b 2) d,a,b,c 3) a,c,b,d 4) a,b,c,d

19. Arrange the following limits in the ascending order

a) $\underset{x\to\infty}{Lim}\left(\frac{1+x}{2+x}\right)^{x+2}$ b) $\underset{x\to 0}{Lim}(1+2x)^{3/x}$

c) $\underset{\theta\to 0}{Lim}\frac{\sin\theta}{2\theta}$ d) $\underset{x\to 0}{Lim}\frac{\log(1+x)}{x}$

1) a,b,c,d 2) a, c, d, b 3) a, d, c, b 4) c,d, a, b

20. Arrange the following limits in the descending order.

a) $\underset{x\to 3-}{Lim}\frac{3-x}{|x-3|}$

b) $\underset{x\to 0}{Lim}\frac{(1+x)^{\frac{1}{8}}-(1-x)^{\frac{1}{8}}}{x}$

c) $\underset{x\to 0}{Lim}\frac{\tan x-\sin x}{x^3}$

d) $\underset{x\to\infty}{Lim}\left\{\sqrt{x^2+6x+7}+x\right\}$

1) b,c,d,a 2) d,a,c,b 3) d,c, b, a 4) b,c, a, d

KEY

1) 1	2) 3	3) 3	4) 1	5) 1
6) 4	7) 3	8) 2	9) 3	10) 3
11) 3	12) 3	13) 3	14)3	15) 2
16) 1	17) 2	18) 1	19) 2	20) 2

LEVEL-V

I. A function 'f' is said to be continuous at a point x $=a$ if $\underset{x\to a^-}{Lim}f(x)=\underset{x\to a^+}{Lim}f(x)=f(a)$. It is said to be discontinuous at x = a if $\underset{x\to a}{Lim}f(x)\neq f(a)$. Given f(x) =

$$\begin{cases}\left(\frac{3}{x^2}\right)\sin 2x^2 & if \quad x<0\\ \frac{x^2+2x+c}{1-3x^2} & if \quad x\geq 0, x\neq\frac{1}{\sqrt{3}}\\ 0 & if \quad x=\frac{1}{\sqrt{3}}\end{cases}$$

1. $\underset{x\to 0^-}{Lt}f(x)=$

1) 2 2) 4 3) 6 4) 8

2. $\underset{x\to 0^+}{Lt}f(x)=$

1) $\frac{c}{4}$ 2) 2c

3) $\frac{c}{3}$ 4) c

3. If f is to be continuous at x=0 then the value of c is

1) 2 2) 4 3) 6 4) 8

II. For all real values of u and v a function 'f' is defined as $2f(u)\cos v=f(u+v)+f(u-v)$ and also $f(0)=\underset{x\to 0}{Lt}\left\{\frac{1+\tan x}{1+\sin x}\right\}^{\operatorname{cosec} x}$ and $f\left(\frac{\pi}{2}\right)=m$ where m is the no.of points at which th function g(x)=[x] is not continues in [2, 3) then

1. $f(x)+f(-x)=$

1) cosx 2) sinx

3) 2cosx 4) 2sinx

2. $f(\pi+x)+f(-x)=$

1) 0 2) 1

3) 2cosx 4) non of these

3. $f(\pi-x)+f(x)=$

1) 2sinx 2) sinx

3) cosx 4) 2cosx

KEY

I.	1. 3	2. 4	3. 3
II.	1. 3	2. 4	3. 1

PREVIOUS EAMCET QUESTIONS

2005

1. $\underset{x\to 0}{Lim}\,x^2\sin\frac{\pi}{x}=$

1) 1 2) 0

3) does not exist 4) ∞

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

then $\lim_{x\to 2}\frac{f(x)-f(2)}{x-2}=$

1) 0 2) -1 3) 1 4) $-\frac{1}{2}$

3. If $f:R\to R$ is definesd by

$$f(x)=\begin{cases}\frac{x+2}{x^2+3x+2} & if \quad x\in R-\{1,-2\}\\ -1 & if \quad x=-2\\ 0 & if \quad x=-1\end{cases}$$

then f is continuous on the set :

1) R 2) $R-\{-2\}$

3) $R-\{-1\}$ 4) $R-\{-1,-2\}$

2004

4. $\lim_{n\to\infty}\sum_{h=1}^{n}\left(h^2x\right)=$

1) x 2) $\frac{x}{2}$ 3) $\frac{x}{3}$ 4) $\frac{x}{4}$

5. If $f(x)=\begin{cases}[x] & if \quad -3<x\le -1\\ |x| & if \quad -1<x<1\\ 1[-x] & if \quad 1\le x<3\end{cases}$

Then $\{x/f(x)\ge 0\}=$

1) $(-1,3)$ 2) $[-1,3]$ 3) $(-1,3]$ 4) $\{-1,3\}$

2003

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

1) $\sqrt{3}$ 2) $\frac{1}{\sqrt{3}}$ 3) $-\sqrt{3}$ 4) $-\frac{1}{\sqrt{3}}$

7. If a > 0 and $\lim_{x\to a}\frac{a^x-x^a}{x^x-a^a}=-1$ then a =

1) 0 2) 1 3) e 4) 2e

8. If $f(x)=\begin{cases}\frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & for\ 1n<0\le\\ 2x^2+3x-2 & for\ 0\le x\le 1\end{cases}$

is continuous at $x=0$ then $k=$

1) –4 2) -3 3) -2 4) -1

2002

9. $\lim_{x\to 0}\frac{4^x-9^x}{x\left(4^x+9^x\right)}=$

1) $\log\left(\frac{3}{2}\right)$ 2) $\log\left(\frac{2}{3}\right)$

3) $\log\left(\frac{4}{3}\right)$ 4) $\log 2$

10. The quadratic equation whose roots l,m where

$l=\lim_{\theta\to 0}\frac{3\sin\theta-4\sin^2\theta}{\theta}$, $m=\lim_{\theta\to 0}\frac{2\tan\theta}{\theta\left(1-\tan^2\theta\right)}$ is

1) $x^2-5x+6=0$ 2) $x^2+5x+6=0$
3) $x^2-x+6=0$ 4) $x^2-x-6=0$

11. The set of all discontinuous of f(x) = x-[x] is
1) Set of all integers
2) Set of all irrational numbers
3) Set of all real numbers
4) Set of fractional vlaues

12. If $f(x)=\begin{cases}a^2\cos^2x+b^2\sin^2x, x\le 0\\ e^{ax+b}, x>0\end{cases}$

at x = 0 f(x) is continuous then

1) $2\log|a|=b$ 2) $2\log|b|=e$

3) $\log a=2\log|b|$ 4) $a=b$

2001

13. If $f(x)=\begin{cases}2x+b\,(x<\alpha)\\ x+d\,(x\ge\alpha)\end{cases}$ is such that

$\lim_{x\to\alpha}f(x)=l$, then $l=$

1) 2d-b 2) 2b-d 3) 2d+b 4) b-2d

14. $\lim_{x\to\infty}\left(\frac{x+a}{x+b}\right)^{x+b}$

1) 1 2) e^{b-a} 3) e^{a-b} 4) e^b

15. $\lim_{x\to 0} \frac{x.10^x - x}{1-\cos x}$

1) log 10 2) 2log10 3) 3log 10 4) 4log 10

16. If $f(x)=\frac{x^2-10x+25}{x^2-7x+10}$ for x ¹ 5 and f is con tinuous at x=5, then f(5) =

1) 0 2) 5 3) 10 4) 25

2000

17. $\lim_{\theta\to\frac{\pi}{2}} \frac{1-\sin\theta}{\cos\theta\left(\frac{\pi}{2}-\theta\right)} =$

1) 1 2) -1 3) $-\frac{1}{2}$ 4) $\frac{1}{2}$

18. $\lim_{x\to 0} \frac{\log_e(1+x)}{3^x-1} =$

1) $\log_e 3$ 2) 0 3) 1 4) $\log_3 e$

19. If the function $f(x)=\begin{bmatrix} \frac{\sin 3x}{x} & (x\neq 0) \\ \frac{k}{2} & (x=0) \end{bmatrix}$ is con tinuous at x=0, then k=

1) 3 2) 6 3) 9 4) 12

1999

20. $\lim_{x\to\infty} \frac{2x+7\sin x}{4x+3\cos x} =$

1) 1 2) -1 3) $\frac{1}{2}$ 4) $-\frac{1}{2}$

1998

21. $\lim_{x\to 0} \log\left|\frac{\log(1+x)}{x}\right| =$

1) 0 2) 1 3) e 4) 1/e

22. $\lim_{x\to\infty}\left(\frac{a^{1/x}+b^{1/x}+c^{1/x}}{3}\right)^x$, where a,b,c are real and non-zero =

1) 0 2) $(abc)^{1/3}$ 3) $(abc)^{-1/3}$ 4) 1

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

1) 2 2) -2 3) 0 4) 1

24. $\lim_{x\to 0}\left(\frac{1}{\sin^2 x}-\frac{1}{\sinh^2 x}\right) =$

1) $2/3$ 2) 0 3) $1/3$ 4) $-2/3$

25. If $f(x)=\frac{\sin x}{x}, x\neq 0$ is to be continuous at x=0 then f(0)=

1) 0 2) 1 3) -1 4) 2

1997

26. $\lim_{x\to\infty} \frac{|3x^2+1|}{2x^2+1} =$

1) $3/2$ 2) $2/3$ 3) $-3/2$ 4) $-2/3$

27. Given that the function f is defined by

$f(x)=\begin{cases} 2x-1, & x>2 \\ k, & x=2 \\ x^2-1, & x<2 \end{cases}$ is continuous. Then k=

1) 2 2) 3 3) 4 4) -3

1996

28. $\lim_{x\to 0} \frac{x^2}{\int_0^x \tan^{-1} x\,dx} =$

1) 2 2)1 3) 3 4) -1

29. $\lim_{n\to\infty} \frac{3.2^{n+1}-4.5^{n+1}}{5.2^n+7.5^n} =$

1) $-20/7$ 2) +20/7 3) 10/7 4) -10/7

30. If $f(x)=x^{\frac{1}{x-1}}$ for $x\neq 1$ and f is continuous at x=1 then f(1) =

1) e 2) e^{-1} 3) e^{-2} 4) e^2

1995

31. $\lim_{x\to 0} \frac{x}{\sqrt{x+4}-2} =$

1) 4 2) $\sqrt{2}$ 3) $2\sqrt{2}$ 4) $1/\sqrt{2}$

32. $\lim_{x\to 0}\left(\frac{\int_0^x \sin^3 x\cos x\,dx}{x^4}\right) =$

1) 0.25 2) 2.5 3) 5.2 4) 0.52

33. If $f(x)=\begin{cases}\dfrac{\tan x}{x}, & x \neq 0\\ =1, & x=0\end{cases}$ then f(x) at x=0 is

1) differentiable   2) Continous
3) Discontinuous   4) None

1994

34. $f(x)=\dfrac{x^2}{|x|}$, $x \neq 0$; f(0) = 0 then

1) f(x) is dicontinuous everwhere
2) f(x) is continuous everywhere
3) f(x) exists in (-1,1)
4) f(x) exists in (-2,2)

35. $\underset{x\to 0}{Lim}\dfrac{e^{\tan x}-e^x}{\tan x - x}=$

1) 1   2) e   3) e^{-1} 4) 0

36. $\underset{x\to 1+}{Lim}\dfrac{\sqrt{x-1}+\sqrt{x-1}}{\sqrt{x^2-1}}=$

1) $\frac{1}{2}$ 2) $\sqrt{2}$ 3) 1   4) $\frac{1}{\sqrt{2}}$

1993

37. $\underset{x\to 0}{Lim}\dfrac{a^x-b^x}{x}=$

1) $xa^{x-1}-xb^{x-1}$ 2) log a/b 3) log b/a 4) log ab

38. $\underset{x\to \infty}{Lim}\left(\dfrac{x}{1+x}\right)^x=$

1) 1   2) e   3) 1/e   4) ¥

39. $\underset{n\to \infty}{Lim}\dfrac{1}{n^3}\left\{1+3+6+..........+\dfrac{n(n+1)}{2}\right\}=$

1) 0   2) 2   3) $\frac{1}{6}$ 4) $\frac{1}{3}$

1992

40. The function $f(x)=\dfrac{x}{1+|x|}$ is differentiable at

1) every where   2) except at x = ±1
3) except at x = 0   4) except at x = 0 or ±1

41. If a,b,c,d are positive real numbers then

$\underset{n\to \infty}{Lim}\left(1+\dfrac{1}{a+bn}\right)^{c+dn}=$

1) $e^{d/b}$ 2) $e^{c/a}$ 3) $e^{c+d/a+b}$ 4) $e^{a+b/c+d}$

1991

42. If $f(x)=\dfrac{3x+4\tan x}{x}$, $x \neq 0$ is continuous at x=0 then f(0) =

1) 5   2) 6   3) 7   4) 8

43. $\underset{x\to 0}{Lim}\dfrac{x-\sin x}{x+\cos^2 x}=$

1) 0   2) 1   3) -1   4) 2

1990

44. $\underset{n\to \infty}{Lim}\dfrac{\sin n\theta}{\sqrt{n}}=$

1) 0   2) ∞ 3) 1   4) 2

KEY

1) 2	2) 2	3) 3	4) 3	5) 1
6) 2	7) 1	8) 3	9) 2	10) 1
11) 1	12) 1	13)1	14) 3	15) 2
16) 1	17) 4	18) 4	19) 2	20) 3
21) 1	22) 2	23) 3	24) 1	25) 2
26) 1	27) 2	28) 1	29) 1	30) 1
31) 1	32) 1	33) 2	34) 2	35) 1
36) 2	37) 2	38) 3	39) 3	40) 1
41) 1	42) 3	43) 1	44) 1	