1. $\underset{n\to\infty}{\text{Limit}} \dfrac{5^{n+1}+3^n-2^{2n}}{5^n+2^n+3^{2n+3}} =$

(A) 5 (B) 3 (C) 1 (D) zero

2. $\underset{x\to -1}{\text{Limit}} \dfrac{\cos 2-\cos 2x}{x^2-|x|} =$

(A) $2\cos 2$ (B) $-2\cos 2$ (C) $2\sin 2$ (D) $-2\sin 2$

3. The value of $\underset{x\to 0}{\text{Limit}} \dfrac{1}{x}\sqrt{\dfrac{1-\cos 2x}{2}}$ is:

(A) 1 (B) -1 (C) 0 (D) none

4. $\underset{x\to 0}{\text{Limit}} \sin^{-1}(\sec x)$.

(A) is equal to $\pi/2$ (B) is equal to 1 (C) is equal to zero (D) none of these

5. $\underset{x\to 5}{\text{Limit}} \dfrac{x^2-9x+20}{x-[x]}$ where [x] is the greatest integer not greater than x:

(A) is equal to 1 (B) 0 (C) 4 (D) none

6. $\underset{x\to -\pi}{\text{Limit}} \dfrac{|x+\pi|}{\sin x}$:

(A) is equal to -1 (B) is equal to 1 (C) is equal to π (D) does not exist

7. $\underset{x\to 3}{\text{Limit}} \dfrac{(x^3+27)\ln(x-2)}{(x^2-9)} =$

(A) -8 (B) 8 (C) 9 (D) -9

8. $\underset{x\to 1}{\text{Limit}} \dfrac{\sum_{k=1}^{100} x^k-100}{x-1} =$

(A) 0 (B) 5050 (C) 4550 (D) -5050

9. $\underset{x\to\infty}{\text{Limit}} \left(\sqrt{(x+a)(x+b)}-x\right) =$

(A) $\sqrt{ab}$ (B) $\dfrac{a+b}{2}$ (C) ab (D) none

10. $\underset{x\to\infty}{\text{Limit}} \dfrac{x^3\cdot\sin\frac{1}{x}+x+1}{x^2+x+1} =$

(A) 0 (B) 1/2 (C) 1 (D) none

11. $\underset{n\to\infty}{\text{Limit}} \dfrac{(n+2)!+(n+1)!}{(n+3)!}$, $n\in N =$

(A) 0 (B) 1 (C) 2 (D) -1

12. $\underset{x\to 0}{\text{Limit}} |x|^{\sin x} =$

(A) 0 (B) 1 (C) -1 (D) none of these

13. $\underset{x\to\infty}{\text{Limit}} \left(\frac{x^2-2x+1}{x^2-4x+2}\right)^x =$

(A) 1 (B) 2 (C) e^2 (D) e

14. The values of a and b such that $\underset{x\to 0}{\text{Lim}} \frac{x(1+a\cos x)-b\sin x}{x^3} = 1$ are

(A) $\frac{5}{2}, \frac{3}{2}$ (B) $\frac{5}{2}, -\frac{3}{2}$ (C) $-\frac{5}{2}, -\frac{3}{2}$ (D) $-\frac{5}{2}, \frac{3}{2}$

15. $\underset{x\to 0}{\text{Limit}} \frac{2\left(\sqrt{3}\sin\left(\frac{\pi}{6}+x\right)-\cos\left(\frac{\pi}{6}+x\right)\right)}{x\sqrt{3}\left(\sqrt{3}\cos x-\sin x\right)} =$

(A) $-1/3$ (B) 2/3 (C) 4/3 (D) $-4/3$

16. If $f(x) = \begin{cases} \frac{x}{2}-1, & x\geq 1 \\ 2x-2, & x<1 \end{cases}$, $g(x) = \begin{cases} \frac{x}{2}+1, & x>0 \\ -x+1, & x\leq 0 \end{cases}$ and $h(x) = |x|$

then find $\underset{x\to 0}{\text{Lim}} f(g(h(x)))$

(A) 1 (B) 0 (C) –1 (D) does not exists

17. $\underset{x\to 1}{\text{Limit}} (1 - x + [x - 1] + [1 - x])$ = where [x] denotes greatest integer function.

(A) 0 (B) 1 (C) -1 (D) does not exist

18. $\underset{x\to 0}{\text{Lt}} \left\lceil \frac{\sin[x-3]}{[x-3]} \right\rceil$, where [.] denotes greatest integer function is :

(A) 0 (B) 1 (C) does not exist (D) sin 1

19. Let $f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right)+\sin\left(\frac{1}{x^2}\right) & x\neq 0 \\ 0 & x=0 \end{cases}$, then $\lim_{x\to\infty} f(x)$ equals

(A) 0 (B) $-1/2$ (C) 1 (D) none of these.

20. $\lim_{x\to a^-} \left(\frac{|x|^3\left\lceil\frac{x}{a}\right\rceil}{a} - \left\lfloor\frac{x}{a}\right\rfloor\right)$ (a > 0), where [x] denotes the greatest integer less than or equal to x is

(A) a^2+1 (B) a^2-1 (C) a^2 (D) $-a^2$

21. Let α, β be the roots of $ax^2 + bx + c = 0$, where $1 < \alpha < \beta$. Then $\underset{x\to x_0}{\text{Lim}} \frac{|ax^2+bx+c|}{ax^2+bx+c} = 1$ then which of the following statements is incorrect

(A) $a > 0$ and $x_0 < 1$ (B) $a > 0$ and $x_0 > \beta$

(C) $a < 0$ and $\alpha < x_0 < \beta$ (D) $a < 0$ and $x_0 < 1$

22. $\underset{n\to\infty}{\text{Limit}} \dfrac{1.n+2(n-1)+3(n-2)+.....+n.1}{1^2+2^2+3^2+.....+n^2}$ has the value :

(A) $\dfrac{1}{2}$ (B) $\dfrac{1}{3}$ (C) $\dfrac{1}{4}$ (D) 1

23. $\underset{x\to 0}{\text{Lim}} \left\lceil \dfrac{\left(1-e^x\right)^{\frac{\sin x}{|x|}}}{} \right\rceil$ is (where [·] represents greatest integral part function)

(A) – 1 (B) 1 (C) 0 (D) does not exist

24. If $\ell = \lim\limits_{x\to\infty} (\sin\sqrt{x+1} - \sin\sqrt{x})$ and $m = \lim\limits_{x\to-\infty} [\sin\sqrt{x+1} - \sin\sqrt{x}]$ where [.] denotes the greatest integer function then :

(A) $\ell = m = 0$ (B) $\ell = 0$; m is undefined

(C) ℓ, m both do not exist (D) $\ell = 0$, $m \neq 0$ (although m exist)

25. If $f(x) = \sum\limits_{\lambda=1}^{n} \left(x - \dfrac{1}{\lambda}\right)\left(x - \dfrac{1}{\lambda+1}\right)$ then $\lim\limits_{n\to\infty} f(0)$ is.

(A) 1 (B) –1 (C) 2 (D) None

26. The limit $\lim\limits_{\theta\to 0} \left(\left\lfloor \dfrac{\lceil n\sin\theta \rceil}{\theta} \right\rfloor + \left\lfloor \dfrac{\lceil n\tan\theta \rceil}{\theta} \right\rfloor\right)$, where [x] is the greatest integer function and $n \in I$, is

(A) 2n (B) 2n + 1 (C) 2n – 1 (D) does not exist

27. The limit $\underset{x\to\infty}{\text{Limit}}\ x - x^2 \ell n \left(1 + \dfrac{1}{x}\right)$ is equal to :

(A) 1/2 (B) 3/2 (C) 1/3 (D) 1

28. $\lim\limits_{x\to\pi/2} \left\lfloor \dfrac{x - \frac{\pi}{2}}{\cos x} \right\rfloor$ is : (where [.] represents greatest integer function.

(A) – 1 (B) 0 (C) – 2 (D) does not exist

29. If $f(x) = \sin x$, $x \neq n\pi$, $n = 0, \pm 1, \pm 2, \pm 3, ...$

$= 2$, otherwise and

$g(x) = x^2 + 1$, $x \neq 0, 2$

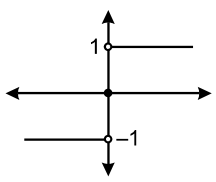
$= 4$, $x = 0$

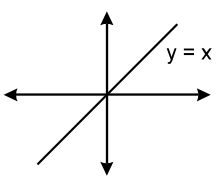
$= 5$, $x = 2$

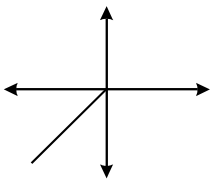
then $\underset{x\to 0}{\text{Limit}}$ g [f(x)] is :

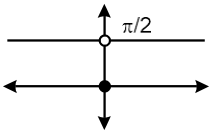
(A) 1 (B) 0 (C) 4 (D) does not exists

30. The graph of the function $f(x) = \underset{t\to 0}{\text{Lim}} \left(\dfrac{2x}{\pi}\cot^{-1}\dfrac{x}{t^2}\right)$, is

(A) 

(B) 

(C) 

(D) 

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	D	C	D	D	D	D	C	B	B	C
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	A	B	C	C	C	B	C	C	C	C
D	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	D	A	A	B	A	C	A	C	A	A