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Class: XII
Subject: Maths
Topic: Limit and Continuity
No. of Questions: 25

Q1. If $f(x) = \lim_{n\to\infty} \frac{x^{2n}-1}{x^{2n}+1}$, then

A. f(x) = 1 for |x| =

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

C. $f(x) = \begin{cases} 1 & \text{for } |x| > 1 \\ -1 & \text{for } |x| \le 1 \end{cases}$

D. f is not defined for any value of x

Q2. Let $f(y) = \sin \frac{y-a}{2} \tan \frac{\pi y}{2a}$, $y \neq a$ .The value of f(a) so that f is a continuous function is

A. π/a

B. $-a/\pi$

C. $\pi/2a$

D. none of these

Q3. Let $f(x) = \begin{cases} \frac{\sqrt{1+ax}-\sqrt{1-ax}}{x}, & -1 \le x < 0 \\ \frac{2x+1}{x-2}, & 0 \le x \le 1 \end{cases}$ The value of a such that f is continuous on [– 1, 1] is

A. 1/2

B. –1/2

C. 1

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D. –1

Q4. The value of k (k > 0) for which the function

$f(x) = \frac{(e^x - 1)^4}{\sin(x^2/k^2)\log(1 + (x^2/2))}, x \neq 0; f(0) = 8$ may be a continuous function is

A. 1

B. 4

C. 2

D. 3

Q5. If f be a function on [0, 1] defined by $f(x) = (1/2)^n$, $(1/2)^{n+1} \leq x < (1/2)^n$, n = 0, 1, 2, …, then

A. fis a continuous function

B. f is continuous except for x = 1/2

C. f is continuous except for finitely many points

D. the set of points where f is not continuous is infinite

Q6. If f : **R** $\rightarrow$ **R** is a function defined by $f(x) = [x] \cos\left(\frac{2x-1}{2}\right)\pi$, where [x] denotes the greatest integer function, then f is

A. discontinuous only at x = 0

B. discontinuous only at non-zero integral value of x

C. continuous only at x = 0

D. continuous for every real x

Q7. If f(x) = $\frac{\log(1+x^2)}{x^4-26x^2+25}$, then

A. f is continuous on [6, 10]

B. f is continuous on [– 2, 2]

C. f is continuous on [– 6, 6]

D. f is continuous on [1, 7]

Q8. The value of $\lim_{x\to 0}\frac{e^{nx}-\left(1+nx+\frac{n^2}{2}x^2\right)}{x^3}(n>0)$ is

A. $\frac{n^2}{6}$

B. $\frac{n^3}{3}$

C. $\frac{n^3}{6}$

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

Q9. The value of $\lim_{x\to 0}\left(\frac{e^x+e^{-x}-2}{x^2}\right)^{1/x^2}$ is

A. $e^{1/2}$

B. $e^{1/4}$

C. $e^{1/3}$

D. $e^{1/12}$

Q10. $\lim_{x \to \pi/2} \frac{\cos x}{\sqrt[3]{(1 - \sin x)^2}}$ is equal to

1. 1
2. 2
3. 21/3
4. None of these

Q11. Let f(x) = $\begin{cases} x + a & ; \ x < 0 \\ |x - 1| & ; \ x \geq 0 \end{cases}$ and $g(x) = \begin{cases} x + 1 & ; \text{ if } x < 0 \\ (x - 1)^2 + b & ; \ x \geq 0 \end{cases}$ If gof is continuous, then

A. a = 2, b = 0
B. a = 0, b = 1
C. a = 1, b = 0
D. b = 1, a = 1

Q12. The function f(x) = $(Sin2x)^{tan^2 2x}$ is not defined at x = π/4. The value of f(π/4) so that f is continuous at x = π/4 is

1. $\sqrt{e}$
2. 1
3. 2
4. None of these

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Q13. If f(x) = $\begin{cases} \frac{\sin(a+1)x + \sin x}{x}, & x < 0 \\ c, & x = 0 \\ \frac{\sqrt{x + bx^2} - \sqrt{x}}{bx^{3/2}}, & x > 0 \end{cases}$ is continuous at x = 0, then

1. a = – 3/2, b = 0, c = 1/2
2. a = – 3/2, b = 1, c = 1/2
3. a = – 3/2, b $\in$ **R**, c = 1/2
4. none of these

Q14. Let f : **R** $\rightarrow$ [0, ∞] be such that $\lim_{x \to 5} \frac{(f(x)^2 - 9)}{\sqrt{|x-5|}} = 0$ Then $\lim_{x \to 5} f(x)$ equals

A. 0

B. 1

C. 2

D. 3

Q15. Let f(x) = g(x) $\frac{e^{1/x} - e^{-1/x}}{e^{1/x} + e^{-1/x}}$, where g is a continuous function. Then $\lim_{x \to 0} f(x)$ exists if

A. g(x) = x + 2

B. g(x) = x^2 + 4

C. g(x) = xh(x), where h(x) is a polynomial

D. g(x) is a constant function

Q16. Let f(x) = $\frac{\sqrt{1-\cos 2(x-2)}}{x-2}, x \neq 2.$ Then $\lim_{x\to 2} f(x)$

A. exists and is equal to $\sqrt{2}$

B. does not exist because $\lim_{x\to 2+} f(x)$ does not exist

C. equal to 1

D. does not exist because $\lim_{x\to 2+} f(x) \neq \lim_{x\to 2-} f(x)$

Q17. Let f(x) = $\begin{cases} \frac{e^{\cos x} - e^x - x}{x^2} & x \neq 0 \\ \frac{3}{2} & x = 0 \end{cases}$ ` The value of α, so that f is a continuous function, is

A. 2

B. 0

C. 3/2

D. None of these

Q18. $\lim_{x\to \pi/2} \frac{\cot x - \cos x}{(\pi - 2x)^3}$ equals

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

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

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

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

Q19. Let f(x) = $\frac{x(1+a\cos x)-b\sin x}{x^3}$, $x \neq 0$ and f(0) = 1. The values of a and b, respectively, so that f is a continuous function, are

A. 5/2 and 3/2

B. 5/2 and – 3/2

C. -5/2 and – 3/2

D. None of these

Q20. Let f be a continuous function on **R** such that $f(1/2^n) = (\sin e^n)\, e^{-n^2} + \frac{2n^2}{n^2+1}$. Then the value of f(0) is

A. 1

B. 1/2

C. 2

D. None of these

Q21. $if\ \ f(x) = \begin{cases} \frac{1-\cos 4x}{x^2}, & when\ x<0 \\ \frac{a\sqrt{x}}{\sqrt{16+\sqrt{x}}-4}, & when\ x=0 \\ & when\ x>0 \end{cases}$ And f is continuous at x = 0, then find the value of a.

[Delhi 2013C]

Q22. Find the value of k, so that the function f defined by $\begin{cases} \frac{k\cos x}{\pi-2x}, & if \times \neq \frac{\pi}{2} \\ 3, & if \times = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$

[Hots; Delhi 2012C, Foreign 2011]

Q23. For what values of λ, is the function f (x)$= \begin{cases} \lambda(x^2-2x), & if\ x \leq 0 \\ 4x+1, & if\ x > 0 \end{cases}$ is continuous at x = 0?

[Foreign 2001]

Q24. Find all points of discontinuity of f, where f is defined as follows F (x)= $\begin{cases} |x|+3, & x \leq -3 \\ -2x, & -3 < x < 3 \\ 6x+2, & x \geq 3 \end{cases}$

[Delhi 2010]

Q25. For what value of k is the following function continuous at x = 2? f (x)= $\begin{cases} 2x+1\ , & x < 2 \\ k\ , & x = 2 \\ 3x-1\ , & x > 2 \end{cases}$

[Delhi 2008]