Learning LaTeX

EE24BTECH11053 - S A Aravind Eswar*

I. SECTION B

6. If $f(1) = 1, f^1(1) = 2$, then $\lim_{x\to 1} \frac{\sqrt{f(x)} - 1}{\sqrt{x} - 1}$ is [2002]

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

7. f is defined in [-5,5] as [2002]
$f(x) = x$ if x is rational
$= -x$ if x is irrational. Then

1) $f(x)$ is continuous at every x, except $x = 0$
2) $f(x)$ is discontinuous at every x, except $x = 0$
3) $f(x)$ is continuous everywhere
4) $f(x)$ is discontinuous everywhere

8. $f(x)$ and $g(x)$ are two differentiable functions on [0,2] such that $f''(x) - g''(x) = 0, f'(1) = 2g'(1) = 4, f(2) = 3g(2) = 9$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is[2002]

1) 0
2) 2
3) 10
4) 5

9. If $f(x + y) = f(x).f(y) \forall x, y$ and $f(5) = 2, f'(0) = 3$, then $f'(5)$ is [2002]
3

1) 0
2) 1
3) 6
4) 2

10. $\lim_{x\to\infty} \frac{1 + 2^4 + 3^4 + \ldots n^4}{n^5} - \lim_{x\to\infty} \frac{1 + 2^3 + 3^3 + \ldots n^3}{n^5}$ [2003]
[2003]

1) $\frac{1}{5}$
2) $\frac{1}{30}$
3) Zero
4) $\frac{1}{4}$

11. If $\lim_{x\to 0} \frac{\log(3 + x) - \log(3 - x)}{x} = k$, then the value of k is [2003]

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

12. The value of $\lim_{x\to 0} \frac{\int_0^{x^2} \sec^2 t dt}{x \sin x}$ is [2003]

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

13. Let $f(a) = g(a) = k$ and their nth derivatives $f^n(a), g^n(a)$ exist and are not equal for some n. Further if $\lim_{x\to a} \frac{f(a)g(x) - f(a) - g(a)f(x) + f(a)}{g(x) - f(x)} = 4$ then the value of k is [2003]

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

14. $\lim_{x\to\frac{\pi}{2}} \frac{\left[1 - tan\left(\frac{x}{2}\right)\right] [1 - \sin x]}{\left[1 + tan\left(\frac{x}{2}\right)\right] [\pi - 2x]^3}$ is [2003]

1) ∞
2) $\frac{1}{8}$
3) 0
4) $\frac{1}{32}$

15. If $f(x) = \begin{cases} xe^{-\left(\frac{1}{|x|} + \frac{1}{x}\right)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ then f(x) is

1) discontinuous every where
2) continuous as well as differentiable for all x
3) continuous for all x but not differentiable at $x = 0$
4) neither differentiable not continuous at $x = 0$

16. if $\lim_{x\to\infty}\left(1+\frac{a}{x}+\frac{b}{x^2}\right)^{2x}=e^2$, then the values of a and b, are [2004]

1) $a=1$ and $b=2$
2) $a=1$and $b\in\boldsymbol{R}$
3) $a\in\boldsymbol{R}, b=2$
4) $a\in\boldsymbol{R}, b\in\boldsymbol{R}$

17. $f(x)=\frac{1-\tan x}{4x-\pi}, x\neq\frac{\pi}{4}, x\in\left[0,\frac{\pi}{4}\right]$.If $f(x)$ is continuous in $\left[0,\frac{\pi}{2}\right]$,then $f\left(\frac{\pi}{4}\right)$is

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

18. $\lim_{n\to\infty}\left[\frac{1}{n^2}\sec^2\frac{1}{n^2}+\frac{2}{n^2}\sec^2\frac{4}{n^2}\ldots\ldots\ldots\ldots\frac{1}{n}sec^2 1\right]$ equals [2005]

1) $\frac{1}{2}\sec 1$
2) $\frac{1}{2}\operatorname{cosec} 1$
3) $\tan 1$
4) $\frac{1}{2}\tan 1$

19. Let α and β be the distinct roots of $ax^2+bx+c=0$, then, $\lim_{x\to\alpha}\frac{1-\cos(ax^2+bx+c)}{(x-a)^2}$ is equal to [2005]

1) $\frac{a^2}{2}(\alpha-\beta)^2$
2) 0
3) $\frac{-a^2}{2}(\alpha-\beta)^2$
4) $\frac{1}{2}(\alpha-\beta)^2$

20. Suppose $f(x)$ is a differentiable at $x=1$ and $\lim_{h\to 0}\frac{1}{h}f(1+h)=5$, then $f'(1)$ equals [2005]

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