Learning LaTeX

EE24BTECH11053 - S A Aravind Eswar*

I. SECTION B

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

(a) 2 (b) 4
(c) 1 (d) $\frac{1}{2}$

2) f is defined in [-5,5] as [2002]
$f(x) = x$ if x is rational
$= -x$ if x is irrational. Then
a) $f(x)$ is continuous at every x, except $x = 0$
b) $f(x)$ is discontinuous at every x, except $x = 0$
c) $f(x)$ is continuous everywhere
d) $f(x)$ is discontinuous everywhere

3) $f(x)$ 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]

(a) 0 (b) 2
(c) 10 (d) 5

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

(a) 0 (b) 1
(c) 6 (d) 2

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

(a) $\frac{1}{5}$ (b) $\frac{1}{30}$
(c) Zero (d) $\frac{1}{4}$

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

(a) $-\frac{2}{3}$ (b) 0
(c) $-\frac{1}{3}$ (d) $\frac{2}{3}$

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

(a) 0 (b) 3
(c) 2 (d) 1

8) 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]

(a) 0 (b) 4
(c) 2 (d) 1

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

(a) ∞ (b) $\frac{1}{8}$
(c) 0 (d) $\frac{1}{32}$

10) 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 [2003]

a) discontinuous every where
b) continuous as well as differentiable for all x
c) continuous for all x but not differentiable at $x = 0$
d) neither differentiable not continuous at $x = 0$

11) 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]

(a) $a = 1$ and $b = 2$ (b) $a = 1$and $b \in \boldsymbol{R}$
(c) $a \in \boldsymbol{R}, b = 2$ (d) $a \in \boldsymbol{R}, b \in \boldsymbol{R}$

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

(a) -1 (b) $\frac{1}{2}$
(c) $-\frac{1}{2}$ (d) 1

13) $\lim\limits_{n\to\infty}\left[\dfrac{1}{n^2}\sec^2\dfrac{1}{n^2} + \dfrac{2}{n^2}\sec^2\dfrac{4}{n^2}\ldots\ldots\ldots\ldots\dfrac{1}{n}sec^2 1\right]$ equals [2005]

(a) $\frac{1}{2}\sec 1$ (b) $\frac{1}{2}\operatorname{cosec} 1$
(c) $\tan 1$ (d) $\frac{1}{2}\tan 1$

[2pt]

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

(a) $\frac{a^2}{2}(\alpha-\beta)^2$ (b) 0
(c) $\frac{-a^2}{2}(\alpha-\beta)^2$ (d) $\frac{1}{2}(\alpha-\beta)^2$

15) Suppose $f(x)$ is a differentiable at $x = 1$ and $\lim\limits_{h\to 0}\dfrac{1}{h}f(1+h) = 5$, then $f'(1)$ equals [2005]

(a) 3 (b) 4
(c) 5 (d) 6