INTERNATIONAL INDIAN SCHOOL BURAIDAH

Worksheet for the Academic Year 2023-24

CLASS:11   SUBJECT: Mathematics

LESSON : Limits and Derivatives.

LEVEL : 1

i) $\lim_{x \to 2}(x+3)^2$ ii) $\lim_{x \to 0}(50)$ iii) $\lim_{y \to \sqrt{2}}\left(\frac{y^2+2}{2y}\right)$ iv) $\lim_{x \to 0}\left(\frac{x^2-5x+6}{x^2-4}\right)$

v) $\lim_{x \to 2}\left(\frac{x^{10}-1024}{x-2}\right)$ vi) $\lim_{x \to 9}\left(\frac{x^{3/2}-27}{x-9}\right)$ vii) $\lim_{x \to a}\left(\frac{x\sqrt{x}-a\sqrt{a}}{x-a}\right)$ viii) $\lim_{x \to 0}\left(\frac{sin^2 8x}{x^2}\right)$

ix) i) $\lim_{x \to 0}\left(\frac{sin^2 ax}{sin^2 bx}\right)$

2. Differentiate the following with respect to x

$$i) x^5 - 6tanx + 4 \quad\quad ii) \frac{2}{\sqrt{x}} + 4\sqrt{x} \quad iii) (\sqrt{x} + \frac{1}{\sqrt{x}})^2$$

LEVEL : 2

i) $\lim_{x \to 1}\left(\frac{x^3-1}{x-1}\right)$ ii) $\lim_{x \to 1/2}\left(\frac{8x^3-1}{16x^4-1}\right)$ iii) $\lim_{x \to -5}\left(\frac{2x^2+9x-5}{x+5}\right)$ iv)) $\lim_{x \to a}\left(\frac{x^m-a^m}{x^n-a^n}\right)$

v) $\lim_{a \to -1/2}\left(\frac{8a^3+1}{2a+1}\right)$ vi) iii) $\lim_{x \to 0}\left(\frac{1-cosx}{x^2}\right)$ iv) $\lim_{x \to 0}\left(\frac{tanx-sinx}{x^3}\right)$

2. Differentiate the following with respect to x

i) $\frac{cos(x-a)}{sinx}$ ii)(x^2+1)sec x

LEVEL : 3

i) $\lim_{x \to \sqrt{2}}\left(\frac{x^2-2}{x^2+\sqrt{2}x-4}\right)$ ii) $\lim_{x \to 2}\left(\frac{1}{x-2} - \frac{2}{x^2-2x}\right)$ iii)$\lim_{x \to 0}\left(\frac{sin5x+sin7x}{5x+sin7x}\right)$ iv) $\lim_{x \to 0}\left(\frac{1-cosmx}{1-cosnx}\right)$

v). f(x) = 5x − 4, 0<x<1

$\quad\quad 4x^3 - 3x, 1 \le x < 2$. Does $\lim_{x \to 1} f(x) \ exist$

2. Differentiate the following with respect to x

i)$(x^2 + tanx)(3 + 4sinx)$ ii)$\frac{2x-cosecx}{cotx+x^2}$ iii)$\frac{x^2 sinx}{(2x+5)}$ iii)$\frac{(3x^{-2}+7)cosx}{5x^2}$ x)$\frac{tanx(x^5)}{1+sinx}$

LEVEL : 4

1). If f(x) = sin x , x>0

       X+k ,   x<0 , find k , if $\lim\limits_{x \to 0} f(x)$ $exist$

2. If $\lim\limits_{x \to 2} \left(\frac{x^n - 2^n}{x-2} \right) = 80$ $and\ n \in N, find\ n$.

3. . If $\lim\limits_{x \to a} \left(\frac{x^5 - a^5}{x-a} \right) = 405$, $find\ all\ possible\ values\ of\ a$.

4. Differentiate the following functions with respect to x from the first principle

i) $x^{-1/2}$ $ii) ax^2 + \frac{b}{x}$ $v) sin2x$ $vi) cos^2 x$

5. If y = $\frac{tanx(x^5)}{1+sinx}$, find $\frac{dy}{dx}$

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