The Indian School, Kingdom Of Bahrain

Class XI Mathematics

1. Evaluate the following limits:

1. $\lim_{x\to 1} \frac{3x^2-3}{x^2-6x+5}$	2. $\lim_{x\to -1} \frac{x^3+1}{x^2+9x+8}$
3. $\lim_{x\to 2} \frac{x^3+x-10}{x^3-4x}$	4. $\lim_{x\to 0} \frac{\sin^2 2x}{x^2}$
5. $\lim_{x\to 0} \frac{Sin^2\, 3x}{Tan^2\, 2x}$	6. $\lim_{x\to 0} \frac{3x+\sin 4x}{2x-\tan 3x}$
7. $\lim_{x\to 0} \frac{1-\cos 2x}{x^2}$	8. $\lim_{x\to 0} \frac{1-\cos 2x}{1-\cos 3x}$
9. $\lim_{x\to a} \frac{x\sqrt{x}-a\sqrt{a}}{x-a}$	10. $\lim_{x\to a} \frac{(x+2)^{\frac{5}{3}}-(a+2)^{\frac{5}{3}}}{x-a}$
11. $\lim_{x\to 0} \frac{\sqrt{1+x}-\sqrt{1-x}}{2x}$	12. $\lim_{x\to 0} \frac{x}{\sqrt{1+x}-\sqrt{1-x}}$
13. $\lim_{x\to \frac{\pi}{2}} \frac{1+\cos 2x}{(\pi-2x)^2}$	14. $\lim_{x\to \frac{\pi}{2}} \frac{1-\sin x}{\left(\frac{\pi}{2}-x\right)^2}$

2. Find value of n, if $n \in \mathrm{N}$ and i) $\lim_{x\to 2} \frac{x^n-2^n}{x-2}$ = 80, ii) $\lim_{x\to 3} \frac{x^n-3^n}{x-3}$ = 108

3. **Differentiate w.r.t. x by using the first principle.**

i) xcosx ii) $\sqrt{\sin x}$ iii) $\sin\sqrt{x}$ iv) cos x^2 v) $\frac{1}{\sqrt{x}}$

vii) $x+\frac{1}{x}$ viii) cos(x + 1) ix) tanx x) $\frac{2x+3}{x-2}$ xi) (x + 1)(x – 3)

4. **Find the derivative w.r.t. x.**

   i) $x^3\sqrt{2-x}$ ii) $x\sqrt{1-x}$ iii) $\frac{x}{1+\tan x}$ iv) $\sin^2 x$

   v) $\frac{\sin x+\cos x}{\sin x-\cos x}$ vi) 3cotx + 4cosecx vii) $\frac{4x+5\cos x}{3x+7\sin x}$ viii) $\sqrt{\tan x}$

   ix) $\sin^3 x$ x) (x + cosx)(x – tanx)

5. For the function f, given by $f(x) = x^2 - 6x + 8$, prove that $f'(5) - 3f'(2) = f'(8)$.

6. If $y = \frac{\cos x - \sin x}{\cos x + \sin x}$ show that $\frac{dy}{dx} + y^2 + 1 = 0$.

7. Find the ratio in which the plane x – 2y + 3z = 17 divides the line joining the points (-2, 4, 7) and (3, -5, 8). Also obtain the coordinates of the point of intersection.

8. Find the equation of the set of all points such that the difference of their distances from (4, 0) and (-4, 0) is always equal to 2.

9. The equation of two diameters of a circle, of radius 7 units are x – y – 5 = 0 and 2x + y – 4 = 0. Find the equation of the circle.

10. The foci of an ellipse are $(\pm 5, 0)$ and eccentricity is $\frac{1}{2}$. Find the equation of the ellipse.

11. Find the locus of a point which is equidistant from the points (3, 2, 1) and (1, 2, 3).

12. Find the mean, variance and standard deviation for the following data.

Class	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	5	6	13	7	10	9

13. Find the mean, standard deviation and hence find the coefficient of variation of the following data.

Class	10 – 20	20-30	30-40	40-50	50-60	60-70	70-80
Class	9	17	32	33	40	10	9

Ans:

1. -3/2	2. 1/3	3. 13/8	4. 4
5. 9/4	6. -7	7. 2	8. 4/9
9. $\frac{3\sqrt{a}}{2}$	10. $\frac{5(a+2)^{2/3}}{3}$	11. ½	12.1
13. ½	14. 1/2		

2(i) 5	2(ii) 4

3.

i) cosx – xsinx	ii) $\frac{\cos x}{2\sqrt{\sin x}}$	iii) $\frac{\cos\sqrt{x}}{2\sqrt{x}}$	iv) $-2x\sin x^2$
v) $\frac{-1}{2x^{3/2}}$	vi) $\frac{x^2-1}{x^2}$	vii) – sin(x + 1)	viii) $\sec^2 x$
ix) $\frac{-7}{(x-2)^2}$	x) 2x – 2		

4.

i) $\frac{-x^3}{2\sqrt{2-x}}+3x^2\sqrt{2-x}$	ii) $\frac{-x}{2\sqrt{1-x}}+\sqrt{1-x}$	iii) $\frac{1+\tan x-x\sec^2 x}{(1+\tan x)^2}$
iv) sin2x	v) $\frac{-2}{(\sin x-\cos x)^2}$	vi) $-3\operatorname{cosec}^2 x-4\operatorname{cosec}x\cot x$
vii) sinx.(28 – 15x) – cosx.(28x + 15) – 35	viii) $\frac{\sec^2 x}{2\sqrt{\tan x}}$	ix) $3\sin^2 x\cos x$
x) (1 – sinx)(x – tanx) – $\tan^2$x(x + cosx)		

7. ratio is 5: 4 and the coordinate of the point is (11/9, -1, 68/9)

8. $15x^2 – y^2 + 8x – 15 = 0$

9. $x^2 + y^2 – 6x + 4y – 36 = 0$

10. $\frac{x^2}{100} + \frac{y^2}{75} = 1$

11. $x – z = 0$

12. mean = 85.2, var = 1000.96, S.D. = 31.64

13. mean = 46.4, var = 172.04, S.D. = 13.1164

Prepared by Biju Thomas