



Brain International School

Vikas Puri, New Delhi

ASSIGNMENT NO. 5

SUBJECT: MATHEMATICS

CLASS-XI

NOV,2025

Ques1. For the hyperbola $16x^2 - 3y^2 - 32x - 12y - 44 = 0$. Find the axes, eccentricity, foci and equation of directrices.

Ques2. Find the area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus rectum.

Ques3. Find the equation of the circle which passes through the point of intersection of the lines $3x-2y=1$ and $4x+y-27=0$ and whose centre is $(2, -3)$.

Ques4. Find the equation of a circle whose diameters are $2x-3y+12=0$ and $x+4y-5=0$ and area is 154 sq. units.

Ques 5. Find whether followings points $(9, 1)$, $(7, 9)$, $(-1, 12)$ and $(6, 10)$ are concyclic or not .

Ques 6. Find equation of circle circumscribing the triangle formed by the lines $x+y=6$, $2x+y=4$ and $x+2y=5$.

Ques 7 Find the equation of the parabola whose focus is $(-3, 0)$ and the directrix $x+5=0$.

Ques 8. Find the vertex, axis, directrix, latus rectum of the following parabolas and also focus

(i) $4y^2 + 12x - 20y + 67 = 0$

(ii) $x^2 + 2y - 3x + 5 = 0$

Ques 9. Find the eccentricity, vertices, foci, directrices, the length of latus rectum for ellipse $x^2 + 4y^2 + 2x + 16y + 13 = 0$.

Ques 10 Find the equation of the ellipse whose axes are parallel to the coordinates axes having its centre at the point $(2, -3)$ and focus $(3, -3)$ and one vertex at $(4, -3)$.

Ques 11. Find the equation of the hyperbola whose directrix is $2x+y=1$ focus $(1, 2)$ and eccentricity $\sqrt{3}$.

Ques 12 Find the coordinates of centre, length of axes, eccentricity, latus rectum, focus, vertices. Equation of directrix of hyperbola $9x^2 - 16y^2 - 18x + 32y - 151 = 0$.

(iii) $\lim_{x \rightarrow 1} \frac{(2x-3)(\sqrt{x}-1)}{2x^2+x-3}$ (iv) $\lim_{x \rightarrow 2} \frac{x^3+4x-16}{2x^3-3x-10}$ (v) $\lim_{x \rightarrow a} \frac{\sqrt{x+2a}-\sqrt{3x}}{\sqrt{x+3a}-2\sqrt{x}}$

(vi) $\lim_{x \rightarrow 0} \frac{\sqrt[3]{8+x}-2}{x}$ (vii) $\lim_{x \rightarrow 1} \frac{x^2-\sqrt{x}}{\sqrt{x}-1}$ (viii) $\lim_{x \rightarrow 0} \frac{\sin ax}{\tan bx}$ (ix) $\lim_{x \rightarrow 0} \frac{1-\cos 2x}{x^2}$ (x) $\lim_{x \rightarrow 0} \frac{\operatorname{cosec} x - \cot x}{x}$

(xi) $\lim_{x \rightarrow 0} \frac{x \tan x}{1-\cos x}$ (xii) $\lim_{x \rightarrow 0} \frac{\tan 2x - \sin 2x}{x^3}$ (xiii) $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{\sin^3 x}$ (xiv) $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{\pi}{2} - x \right) \sec x$ (xv) $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x}-\sqrt{1-2x}}{\sin x}$

(xvi) $\lim_{x \rightarrow 0} \frac{\sin 3x+7x}{4x+\sin 2x}$ (xvii) $\lim_{x \rightarrow 0} \frac{1-\cos x}{\sin^2 x}$

Ques 13. Evaluate the following:

(i) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x}{(\pi - 2x)^2}$

(ii) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\cos x - \sin x}{\cos 2x}$

(iii) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sec^2 x - 2}{\tan x - 1}$

(iv) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan^2 x}{\cos x - \sin x}$

(v) $\lim_{x \rightarrow 0} \frac{1 - \cos x \sqrt{\cos 2x}}{x^2}$

(vi) $\lim_{x \rightarrow \frac{\pi}{2}} \sec x - \tan x$

(vii) $\lim_{x \rightarrow \frac{\pi}{6}} \frac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1}$

(viii) $\lim_{x \rightarrow \frac{\pi}{6}} \frac{\sqrt{3} \sin x - \cos x}{x - \frac{\pi}{6}}$

(ix) $\lim_{x \rightarrow 0} \frac{\tan 3x - 2x}{3x - \sin^2 x}$

(x) $\lim_{x \rightarrow 0} \frac{\sin x - 2 \sin 3x + \sin 5x}{x^3}$

(xi) $\lim_{h \rightarrow 0} \frac{(x+h)^2 \sin(x+h) - x^2 \sin x}{h}$

(xii) $\lim_{x \rightarrow a} \frac{\cos x - \cos a}{x - a}$

(xiii) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan x}{x - \frac{\pi}{4}}$

Differentiate w.r.to x:

Ques14 $\frac{x^4 + x^3 + x^2 + 1}{x}$

Ques15. $(ax^2 + \cot x)(p + q \cos x)$

Ques16. $(\sin x + \cos x)^2$

Ques17. $x^2 \sin x + \cos 2x$

Ques 18 Let $f(x) = \begin{cases} x^2 - 1, & 0 < x < 2 \\ 2x + 3, & 2 \leq x \leq 3 \end{cases}$, then the quadratic equation whose roots are $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$ is

(a) $x^2 - 6x + 9 = 0$ (b) $x^2 - 7x + 8 = 0$ (c) $x^2 - 14x + 49 = 0$ (d) $x^2 - 10x + 21 = 0$

Ques 19 If $f(x) = \frac{(3x+1)(2\sqrt{x}-1)}{\sqrt{x}}$, then $f'(1)$ is equal to

(a) 5 (b) -5 (c) 6 (d) $\frac{11}{2}$

Ques20 If $f(x) = \frac{2-3\cos x}{\sin x}$, then $f'\left(\frac{\pi}{4}\right)$ is equal to

(a) $2\sqrt{2} - 6$ (b) $6 - 2\sqrt{2}$ (c) $3 - \sqrt{2}$ (d) $\sqrt{2} - 3$

Ques21 If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x = 1$ is

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

Ques22 If $y = \frac{1 + \frac{1}{x^2}}{1 - \frac{1}{x^2}}$, then $\frac{dy}{dx}$ is

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