NDA 1 2025

LIVE

MATHS

ANALYTICAL GEOMETRY 3D

MCQS

NAVJYOTI SIR

Crack
EXAMS

30 Jan 2025 Live Classes Schedule

9:00AM	30 JANUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	30 JANUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

AFCAT 1 2025 LIVE CLASSES

12:30PM	REASONING - CODING DECODING	RUBY MA'AM
3:00PM	STATIC GK - UNIVERSE & SOLAR SYSTEMS	DIVYANSHU SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - NUMBER SYSTEM - CLASS 1	NAVJYOTI SIR

NDA 1 2025 LIVE CLASSES

10:00AM	MATHS - ANALYTICAL GEOMETRY 3D	NAVJYOTI SIR
11:30AM	MODERN HISTORY - CLASS 2	RUBY MA'AM
1:00PM	PHYSICS - WORK ENERGY POWER	NAVJYOTI SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	MODERN HISTORY - CLASS 2	RUBY MA'AM
1:00PM	PHYSICS - WORK ENERGY POWER	NAVJYOTI SIR
4:30PM	ENGLISH - ANTONYMS - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - NUMBER SYSTEM - CLASS 1	NAVJYOTI SIR

If the direction cosines $< l, m, n >$ of a line are connected by relation $l + 2m + n = 0$, $2l - 2m + 3n = 0$, then what is the value of $l^2 + m^2 - n^2$?

(a) $\frac{1}{101}$

(b) $\frac{29}{101}$

(c) $\frac{41}{101}$

(d) $\frac{92}{101}$

$$l + 2m + n = 0$$

$$2l - 2m + 3n = 0$$

$$\begin{matrix} p & & q \\ & \times & \\ r & & s \end{matrix} \quad (p \times s) - (q \times r)$$

$$\frac{l}{(2\times3)-(1\times-2)} = \frac{-m}{(1\times3)-(1\times2)} = \frac{n}{(1\times-2)-(2\times2)} = k$$

$$\frac{l}{8} = \frac{-m}{1} = \frac{n}{-6} = k$$

$$\begin{cases} l = 8k \\ m = -k \\ n = -6k \end{cases}$$

$l = 8k$

$m = -k$

$n = -6k$

$l^2 + m^2 + n^2 = 1$

$(8k)^2 + (-k)^2 + (-6k)^2 = 1$

$k^2(64 + 1 + 36) = 1$

$k^2 = \frac{1}{101}$

Ans. (6)

$l^2 + m^2 - n^2$

$(8k)^2 + (-k)^2 - (-6k)^2$

$k^2(64 + 1 - 36) = k^2(29)$

$= \frac{29}{101}$

If (1, –1, 2) and (2, 1, –1) are the end points of a diameter of a sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz - 1 = 0$, then what is $u + v + w$ equal to ?

(PYQ – 2024 – I)

(a) –2

(b) –1

(c) 1

(d) 2

centre $\longrightarrow \left(\frac{1+2}{2}, \frac{-1+1}{2}, \frac{2-1}{2}\right) = \left(\frac{3}{2}, 0, \frac{1}{2}\right)$

$(-u, -v, -w)$

$x^2+y^2+z^2+2ux+2vy+2wz+d=0$

$d = -1$

$u = -\frac{3}{2}$

$v = 0$

$w = -\frac{1}{2}$

-2

$u+v+w$

Ans. (a)

If $< l, m, n >$ are the direction cosines of a normal to the plane $2x - 3y + 6z + 4 = 0$, then what is the value of $49(7l^2 + m^2 - n^2)$?

(PYQ – 2024 – I)

(a) 0

(b) 1

(c) 3

(d) 71

$2x - 3y + 6z + 4 = 0$

dir. ratios of normal = $2, -3, 6$

$$l = \frac{2}{\sqrt{(2)^2+(-3)^2+(6)^2}} = \frac{2}{\sqrt{49}} = \frac{2}{7} \; ; \; m = \frac{-3}{7} \; ; \; n = \frac{6}{7}$$

$$49\left(7l^2 + m^2 - n^2\right) = 49\left(7\left(\frac{4}{49}\right) + \left(\frac{9}{49}\right) - \frac{36}{49}\right) = 28 + 9 - 36 = (1)$$

Ans. (b)

A line through (1, –1, 2) with direction ratios <3, 2, 2> meets the plane $x + 2y + 3z = 18$. What is the point of intersection of line and plane ?

(PYQ – 2024 – I)

(a) (4, 4, 1) ✗

(b) (2, 4, 1) ✗

(c) (4, 1, 4) ✓

(d) (3, 4, 7)

eqn of line, $\frac{x-\alpha}{a} = \frac{y-\beta}{b} = \frac{z-\gamma}{c}$

(α, β, γ) → passing point

a, b, c → dir. – ratios

$\frac{x-1}{3} = \frac{y+1}{2} = \frac{z-2}{2}$

$x + 2y + 3z = 18$ ✓

satisfies both

Ans. (c)

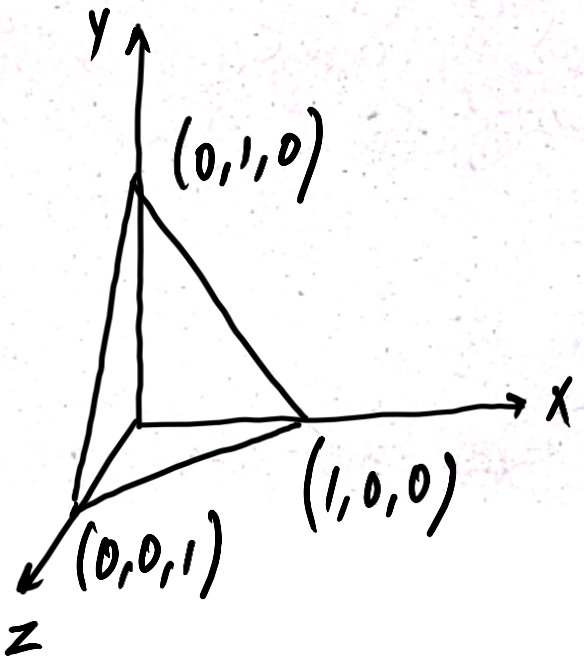
If p is the perpendicular distance from origin to the plane passing through (1, 0, 0), (0, 1, 0) and (0, 0, 1), then what is $3p^2$ equal to ?

(a) 4

(b) 3

(c) 2

(d) 1



(PYQ – 2024 – I)

$\frac{x}{1} + \frac{y}{1} + \frac{z}{1} = 1$ (intercept form of eqn of plane)

$x + y + z = 1$

$x + y + z - 1 = 0$

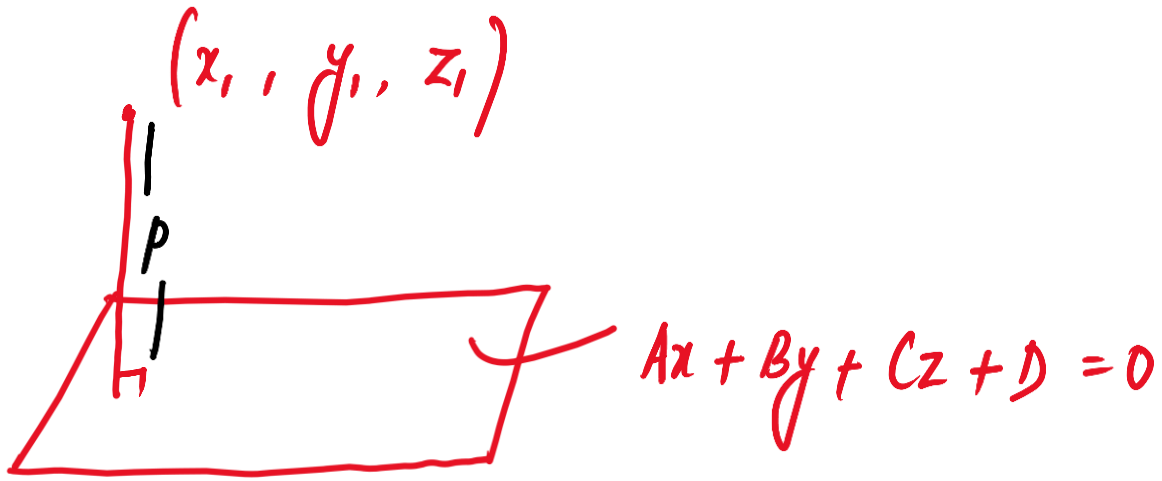
perpendicular distance of plane from (0,0,0)

$$p = \frac{|0+0+0-1|}{\sqrt{1^2+1^2+1^2}} \Rightarrow p = \frac{1}{\sqrt{3}}$$

$$p = \frac{1}{\sqrt{3}}$$

$$p^2 = \frac{1}{3}$$

$$3p^2 = 1$$



$$p = \frac{|Ax_1 + By_1 + Cz_1 + D|}{\sqrt{A^2 + B^2 + C^2}}$$

Ans. (d)

Let $2x^2 + 2y^2 + 2z^2 + 3x + 3y + 3z - 6 = 0$ be a sphere. (PYQ – 2024 – II)

What is the diameter of the sphere?

(a) $\frac{5\sqrt{3}}{4}$

(b) $\frac{5\sqrt{3}}{2}$

(c) $\frac{3\sqrt{5}}{4}$

(d) $\frac{3\sqrt{5}}{2}$

Standard eqn of sphere,

$$x^2+y^2+z^2 + 2ux + 2vy + 2wz + d = 0$$

Divide by 2,

$$x^2+y^2+z^2 + \frac{3}{2}x + \frac{3}{2}y + \frac{3}{2}z - 3 = 0$$

$$2u = \frac{3}{2} \Rightarrow u = \frac{3}{4}$$

$$v = \frac{3}{4} \; ; \; w = \frac{3}{4}$$

$$d = -3$$

$$\text{radius} = \sqrt{u^2+v^2+w^2-d}$$

$u = v = w = \frac{3}{4}$ $\qquad d = -3$

$$\text{radius} = \sqrt{u^2+v^2+w^2-d} = \sqrt{3\left(\frac{3}{4}\right)^2+3}$$

$$= \sqrt{3\left(\frac{9}{16}+1\right)} = \sqrt{3\left(\frac{25}{16}\right)}$$

$$= \frac{5\sqrt{3}}{4}$$

$$\text{Diameter} = 2\left(\frac{5\sqrt{3}}{4}\right) = \frac{5\sqrt{3}}{2}$$

Ans. (b)

Let $2x^2 + 2y^2 + 2z^2 + 3x + 3y + 3z - 6 = 0$ be a sphere. **(PYQ – 2024 – II)**

The centre of the sphere lies on the plane

(a) $2x + 2y + 2z - 3 = 0$

(b) $4x + 4y + 4z - 3 = 0$

(c) $4x + 8y + 8z - 15 = 0$

(d) $4x + 8y + 8z + 15 = 0$

$(-u, -v, -w)$

$\left(-\frac{3}{4}, -\frac{3}{4}, -\frac{3}{4}\right)$

(a) ✗

(b) ✗

(c) ✓

Ans. (d)

Let S be the line of intersection of two planes $x+y+z=1$ and $2x+3y-4z=8$.

(PYQ – 2024 – II)

Which of the following are the direction ratios of S?

(a) $\langle -7, -6, 1 \rangle$

(b) $\langle -7, 6, 1 \rangle$

(c) $\langle -6, 5, 1 \rangle$

(d) $\langle 6, 5, 1 \rangle$

$x + y + z = 1$

$\langle 1, 1, 1 \rangle$

$2x + 3y - 4z = 8$

$\langle 2, 3, -4 \rangle$

$$\begin{vmatrix} x & y & z \\ 1 & 1 & 1 \\ 2 & 3 & -4 \end{vmatrix} = \underset{x}{(-4-3)} \quad \underset{y}{-(-4-2)} \quad \underset{z}{(3-2)}$$

$\langle -7, 6, 1 \rangle$

Ans. (b)

Let S be the line of intersection of two planes $x+y+z=1$ and $2x+3y-4z=8$.

(PYQ – 2024 – II)

If $\langle l, m, n\rangle$ are direction cosines of S, then what is the value of $43(l^2-m^2-n^2)$?

(a) 6

(b) 5

(c) 4

(d) 1

$-7, 6, 1$

$$l=\frac{-7}{\sqrt{(-7)^2+6^2+1^2}} ; \quad m=\frac{6}{\sqrt{(-7)^2+6^2+1^2}} ; \quad n=\frac{1}{\sqrt{(-7)^2+6^2+1^2}}$$

$$l=\frac{-7}{\sqrt{86}} ; \quad m=\frac{6}{\sqrt{86}} ; \quad n=\frac{1}{\sqrt{86}}$$

$$43(l^2-m^2-n^2)=43\left(\frac{49-36-1}{86}\right)=\frac{12}{2}=6$$

Ans. (a)

Let $L: x+y+z+4=0=2x-y-z+8$ be a line and $P: x+2y+3z+1=0$ be a plane. **(PYQ – 2024 – II)**

What are the direction ratios of the line?

(a) $\langle 2, 1, -1 \rangle$

(b) $\langle 0, -1, 2 \rangle$

(c) $\langle 0, 1, -1 \rangle$

(d) $\langle 2, 3, -3 \rangle$

$$L: x+y+z+4=0=2x-y-z+8$$

$$\begin{vmatrix} x & y & z \\ 1 & 1 & 1 \\ 2 & -1 & -1 \end{vmatrix}$$

$$\frac{x}{-1-(-1)} \quad \frac{y}{-(-1-2)} \quad \frac{z}{-1-2}$$

$$\frac{x}{0} \quad \frac{y}{3} \quad \frac{z}{-3}$$

$$\langle 0, 1, -1 \rangle$$

Ans. (c)

Let $L: x+y+z+4=0=2x-y-z+8$ be a line and $P: x+2y+3z+1=0$ be a plane.

(PYQ – 2024 – II)

What is the point of intersection of L and P?

(a) (4, 3, – 3)

(b) (4, – 3, 3)

(c) (–4, – 3, – 3)

(d) (–4, – 3, 3)

$x + 2y + 3z + 1 = 0$

(a) ✗

(b) ✗

(c) ✗

(d) ✓

Ans. (d)

Q) Consider the following statements:

1. Equations $ax + by + cz + d = 0$, $a'x + b'y + c'z + d' = 0$ represent a straight line. ✓
2. Equation of the form

$$\frac{x-\alpha}{\ell} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$$ ✓

represent a straight line passing through the point (α, β, γ) and having direction ratio proportional to l, m, n.

Which of the statements given above is/are correct ?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q) Consider the following statements:

1. Equations $ax + by + cz + d = 0$, $a'x + b'y + c'z + d' = 0$ represent a straight line.
2. Equation of the form

$$\frac{x-\alpha}{\ell} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$$

represent a straight line passing through the point (α, β, γ) and having direction ratio proportional to l, m, n.

Which of the statements given above is/are correct ?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (c)

Q) If the centre of the sphere $ax^2 + by^2 + cz^2 - 2x + 4y + 2z - 3 = 0$ is $(1/2, -1, -1/2)$, what is the value of b ?

(a) 1 (b) -1

(c) 2 (d) -2

$a = b = c$

$x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$

(a) $a = b = c = 1$ —— ✗

(b)

(c) $2u = -1 \Rightarrow u = -\frac{1}{2} \Rightarrow -u = \frac{1}{2}$

$2v = 2 \Rightarrow v = 1 \Rightarrow -v = -1$

$-w = -1/2$

Ans. (c)

Q) If the centre of the sphere $ax^2 + by^2 + cz^2 - 2x + 4y + 2z - 3 = 0$ is $(1/2, -1, -1/2)$, what is the value of b ?

(a) 1 (b) -1

(c) 2 (d) -2

Ans: (c)

Q) What is the length of the perpendicular from the origin to the plane $ax + by + \sqrt{2ab}\,z = 1$?

(a) $1/(ab)$ (b) $1/(a+b)$

(c) $a+b$ (d) ab

Q) What is the length of the perpendicular from the origin to the plane $ax + by + \sqrt{2ab}\, z = 1$?

(a) $1/(ab)$ (b) $1/(a+b)$

(c) $a+b$ (d) ab

Ans: (b)

Q) If O, P are the points (0, 0, 0), (2, 3, –1) respectively, then what is the equation to the plane through P at right angles to OP ?

(a) $2x+3y+z=16$ (b) $2x+3y-z=14$

(c) $2x+3y+z=14$ (d) $2x+3y-z=0$

Q) If O, P are the points (0, 0, 0), (2, 3, –1) respectively, then what is the equation to the plane through P at right angles to OP ?

(a) $2x+3y+z=16$ (b) $2x+3y-z=14$

(c) $2x+3y+z=14$ (d) $2x+3y-z=0$

Ans: (b)

Q) Under what condition do $\left\langle \frac{1}{\sqrt{2}}, \frac{1}{2}, K \right\rangle$ represent direction cosines of a line?

(a) $k = \frac{1}{2}$

(b) $k = -\frac{1}{2}$

(c) $k = \pm\frac{1}{2}$

(d) k can take any value

Q) Under what condition do $\left\langle \frac{1}{\sqrt{2}}, \frac{1}{2}, K \right\rangle$ represent direction cosines of a line?

(a) $k = \frac{1}{2}$

(b) $k = -\frac{1}{2}$

(c) $k = \pm\frac{1}{2}$

(d) k can take any value

Ans: (c)

Q) A plane which passes through the point $(3, 2, 0)$ and the line

$$\frac{x-4}{1}=\frac{y-7}{5}=\frac{z-4}{4}$$ is

(a) $x-y+z=1$

(b) $x+y+z=5$

(c) $x+2y-z=1$

(d) $2x-y+z=5$

Q) A plane which passes through the point $(3, 2, 0)$ and the line

$$\frac{x-4}{1}=\frac{y-7}{5}=\frac{z-4}{4}$$ is

(a) $x-y+z=1$

(b) $x+y+z=5$

(c) $x+2y-z=1$

(d) $2x-y+z=5$

Ans: (a)

Q) The d.r. of normal to the plane through (1, 0, 0), (0, 1, 0) which makes an angle $\pi/4$ with plane $x+y=3$ are

(a) $1, \sqrt{2}, 1$

(b) $1, 1, \sqrt{2}$

(c) $1, 1, 2$

(d) $\sqrt{2}, 1, 1$

Q) The d.r. of normal to the plane through (1, 0, 0), (0, 1, 0) which makes an angle $\pi/4$ with plane $x+y=3$ are

(a) $1, \sqrt{2}, 1$

(b) $1, 1, \sqrt{2}$

(c) $1, 1, 2$

(d) $\sqrt{2}, 1, 1$

Ans: (b)

Q) The shortest distance from the plane $12x+4y+3z=327$ to the sphere $x^2+y^2+z^2+4x-2y-6z=155$ is

(a) 39 (b) 26 (c) $11\frac{4}{13}$ (d) 13

Q) The shortest distance from the plane $12x+4y+3z=327$ to the sphere $x^2+y^2+z^2+4x-2y-6z=155$ is

(a) 39 (b) 26 (c) $11\frac{4}{13}$ (d) 13

Ans: (d)

Q) The two lines $x = ay + b, z = cy + d$ and $x = a`y + b`, z = c`y + d`$ will be perpendicular, if and only if

(a) $aa` + cc` + 1 = 0$

(b) $aa` + bb` + cc` + 1 = 0$

(c) $aa` + bb` + cc` = 0$

(d) $(a + a`)(b + b`) + (c + c`) = 0.$

Q) The two lines $x = ay + b, z = cy + d$ and $x = a`y + b`, z = c`y + d`$ will be perpendicular, if and only if

(a) $aa` + cc` + 1 = 0$

(b) $aa` + bb` + cc` + 1 = 0$

(c) $aa` + bb` + cc` = 0$

(d) $(a + a`)(b + b`) + (c + c`) = 0.$

Ans: (a)

Q) The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{1}=\frac{z-5}{1}$ are coplanar if

(a) $k=3$ or -2

(b) $k=0$ or -1

(c) $k=1$ or -1

(d) $k=0$ or -3

Q) The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{1}=\frac{z-5}{1}$ are coplanar if

(a) $k=3$ or -2

(b) $k=0$ or -1

(c) $k=1$ or -1

(d) $k=0$ or -3

Ans: (d)

Q) The radius of the circle in which the sphere $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19 = 0$ is cut by the plane $x + 2y + 2z + 7 = 0$ is

(a) 4 (b) 1 (c) 2 (d) 3

Q) The radius of the circle in which the sphere $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19 = 0$ is cut by the plane $x + 2y + 2z + 7 = 0$ is

(a) 4 (b) 1 (c) 2 (d) 3

Ans: (d)

Q) Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

(a) $\frac{9}{2}$ (b) $\frac{5}{2}$ (c) $\frac{7}{2}$ (d) $\frac{3}{2}$

Q) Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

(a) $\frac{9}{2}$ (b) $\frac{5}{2}$ (c) $\frac{7}{2}$ (d) $\frac{3}{2}$

Ans: (c)

Q) The intersection of the spheres

$x^2 + y^2 + z^2 + 7x - 2y - z = 13$ and

$x^2 + y^2 + z^2 - 3x + 3y + 4z = 8$

is the same as the intersection of one of the sphere and the plane

(a) $2x - y - z = 1$

(b) $x - 2y - z = 1$

(c) $x - y - 2z = 1$

(d) $x - y - z = 1$

Q) The intersection of the spheres

$x^2 + y^2 + z^2 + 7x - 2y - z = 13$ and

$x^2 + y^2 + z^2 - 3x + 3y + 4z = 8$

is the same as the intersection of one of the sphere and the plane

(a) $2x - y - z = 1$

(b) $x - 2y - z = 1$

(c) $x - y - 2z = 1$

(d) $x - y - z = 1$

Ans: (a)

Q) If the angel θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}\, z + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$ then the value of λ is

(a) $\frac{5}{3}$

(b) $\frac{-3}{5}$

(c) $\frac{3}{4}$

(d) $\frac{-4}{3}$

Q) If the angel θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}\, z + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$ then the value of λ is

(a) $\frac{5}{3}$

(b) $\frac{-3}{5}$

(c) $\frac{3}{4}$

(d) $\frac{-4}{3}$

Ans: (a)

Q) The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is

(a) $0°$ (b) $90°$

(c) $45°$ (d) $30°$

Q) The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is

(a) $0°$ (b) $90°$

(c) $45°$ (d) $30°$

Ans: (b)

Q) What is the equation of the sphere with unit radius having centre at the origin ?

(a) $x^2+y^2+z^2=0$

(b) $x^2+y^2+z^2=1$

(c) $x^2+y^2+z^2=2$

(d) $x^2+y^2+z^2=3$

Q) What is the equation of the sphere with unit radius having centre at the origin ?

(a) $x^2+y^2+z^2=0$ (b) $x^2+y^2+z^2=1$

(c) $x^2+y^2+z^2=2$ (d) $x^2+y^2+z^2=3$

Ans: (b)

Q) What is the sum of the squares of direction cosines of x-axis ?

(a) 0

(b) $\frac{1}{3}$

(c) 1

(d) 3

Q) What is the sum of the squares of direction cosines of x-axis ?

(a) 0

(b) $\frac{1}{3}$

(c) 1

(d) 3

Ans: (c)

Q) What is the distance of the line $2x + y + 2z = 3$ from the origin ?

(a) 1 units

(b) 1.5 units

(c) 2 units

(d) 2.5 units

Q) What is the distance of the line $2x + y + 2z = 3$ from the origin ?

(a) 1 units (b) 1.5 units

(c) 2 units (d) 2.5 units

Ans: (a)

Q) What is the angle between the lines $\frac{x-2}{1}=\frac{y+1}{-2}=\frac{z+2}{1}$ and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$?

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{6}$

(d) None of the above

Q) What is the angle between the lines $\frac{x-2}{1}=\frac{y+1}{-2}=\frac{z+2}{1}$ and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$?

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{6}$

(d) None of the above

Ans: (a)

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