Date
10/04/2020

Lecture notes-17
BCA I year (II Sem)
Subject - Mathematics-II
Topic - Plane (Unit-5)

Exp-20 Find the equation of plane through (1,2,3), parallel to the plane $3x+4y-5z=0$

Solution Let the equation of plane parallel to the given plane $3x+4y-5z=0$ is

$$3x+4y-5z=K$$

If it passes through (1,2,3) then

$$3(1)+4(2)-5(3)=K$$

$$\Rightarrow K=-4$$

Then the required equation of plane is

$$3x+4y-5z=-4$$

or $$3x+4y-5z+4=0$$

Exp 21 Find the equation of plane through (-1,1,1) and (1,-1,1) and perpendicular to the plane $x+2y+2z=5$

Solution

Let the equation of plane is

$$Ax+By+Cz+D=0 \quad \text{--- (i)}$$

If it passes through (-1,1,1) and (1,-1,1)

Then $-A+B+C+D=0$ ——— (ii)

and $A-B+C+D=0$ ——— (iii)

Given, Equation (i) is perpendicular to the plane $x+2y+2z=5$

So $A+2B+2C=0$ ——— (IV)

(By the Condition of perpendi

From (ii) & (iii) $A-B=0$, $C=0$ — (V)

From IV and (V)

$$\frac{A}{-2-0} = \frac{B}{0-2} = \frac{C}{2-(-1)} = \lambda$$

$$\Rightarrow \frac{A}{-2} = \frac{B}{-2} = \frac{C}{3} = \lambda$$

$$\Rightarrow A = -2\lambda, \quad B = -2\lambda, \quad C = 3\lambda$$

Put in Eqn (i) , From (ii) $D=3$

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

Which is equation of required plane.

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Solve itself

Ques-1 Find the equation of the plane through $(1,0,-2)$ and perpendicular to each of the plane $2x+y-z=+2$ and $x-y-z-3=0$

Solution : Same as Exp-21

Exp-24 A Variable plane passes through a fixed point (α,β,γ) and meets the axes of at A, B, C. Show that the locus of the point of intersection of the planes through A, B, C to the Co-ordinate plane is $\alpha x^{-1}+\beta y^{-1}+\gamma z^{-1}=1$

Solution Let the equation of the Variable plane is
$$\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1 \quad \text{——— (1)}$$
Where a, b, c are parameter.

$\because$ The plane (1) passes through the point (α,β,γ)
$$\Rightarrow \frac{\alpha}{a}+\frac{\beta}{b}+\frac{\gamma}{c}=1 \quad \text{——— (2)}$$
The plane (1) meets the Co-ordinate axes in the point A, B, C whose Co-ordinates are $(a,0,0)$ $(0,b,0)$ $(0,0,c)$. The equation of plane through A, B, C and parallel to the Co-ordinate axes are $x=a$, $y=b$, $z=c$ respectively.

Then from (2)
$$\frac{\alpha}{x}+\frac{\beta}{y}+\frac{\gamma}{z}=1$$
Or $\alpha x^{-1}+\beta y^{-1}+\gamma z^{-1}=1$ **Proved**

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