MATHS

BOOKS - MAXIMUM PUBLICATION

THREE DIMENSIONAL GEOMETRY

Example

1. Consider the lines

$$\bar{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + \lambda\left(2\hat{i} - 3\hat{j} - 4\hat{k}\right) \quad ,$$

$$\bar{r} = \left(\hat{i} + \hat{j} + \hat{k}\right) + \mu\left(\hat{i} + 3\hat{j} + 2\hat{k}\right)$$

Write the Cartesian equation.

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2. Consider the lines

$$\bar{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + \lambda\left(2\hat{i} - 3\hat{j} - 4\hat{k}\right) \quad ,$$

$$\bar{r} = \left(\hat{i} + \hat{j} + \hat{k}\right) + \mu\left(\hat{i} + 3\hat{j} + 2\hat{k}\right)$$

Find the angle between the lines.

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3. Find the vector equation of the plane passing through the intersection of the planes $\bar{r}.\left(\hat{i}+\hat{j}+\hat{k}\right)=6$ and $\bar{r}.\left(2\hat{i}+3\hat{j}+4\hat{k}\right)=-5$ at the point (1,1,1) .

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4. Find the equation of the plane passing through the intersection of the planes $x+y+4z+5=0$ and

$2x - y + 3z + 6 = 0$ and contains the point (1,0,0).

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5. Consider the point (-1,-2,-3). In which octant ,the above point lies.

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6. Find the direction cosines of the line joining (-1,-2,-3) and (3,4,5) .

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7. If P is any point such that $OP = \sqrt{50}$ and direction cosines of OP are $\frac{3}{\sqrt{50}}$, $\frac{4}{\sqrt{50}}$ and $\frac{5}{\sqrt{50}}$, then find the co-ordinate of P.

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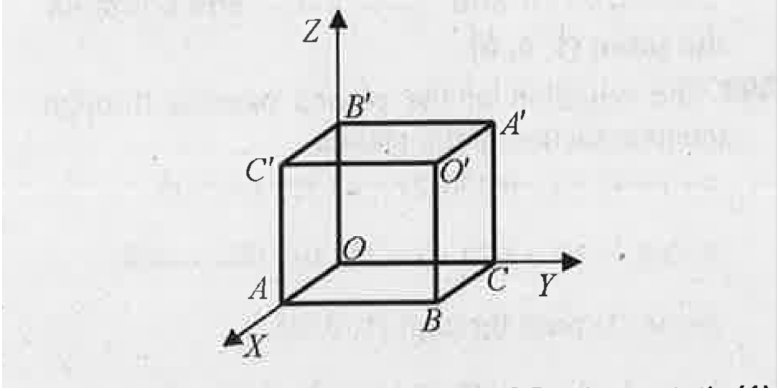
8. Consider a cube of side 'a' unit has one vertex at the origin O.

Write down the co-ordinate O, O' , A and A'



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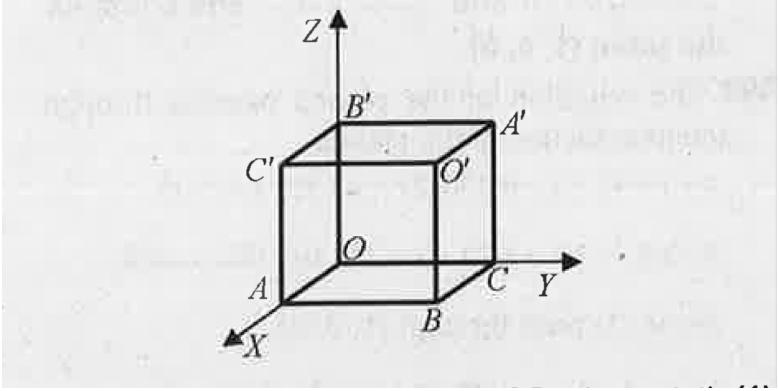
9. Consider a cube of side 'a' unit has one vertex at the origin O.

Find the direction ratios of OO' and AA' .



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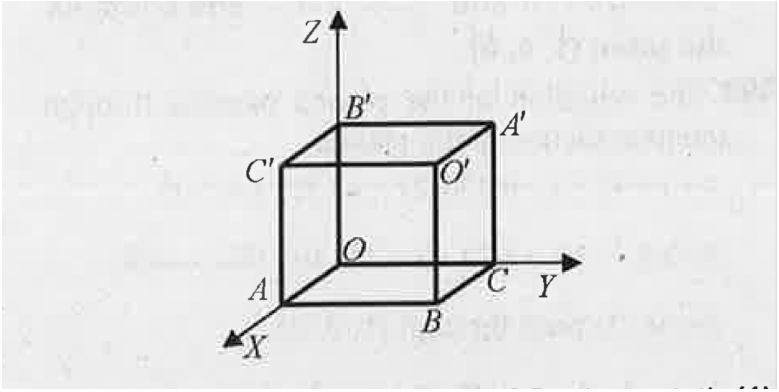
10. Consider a cube of side 'a' unit has one vertex at the origin O.

Show that the angle between the main

diagonals of the above cube is $\cos^{-1}\left(\frac{1}{3}\right)$



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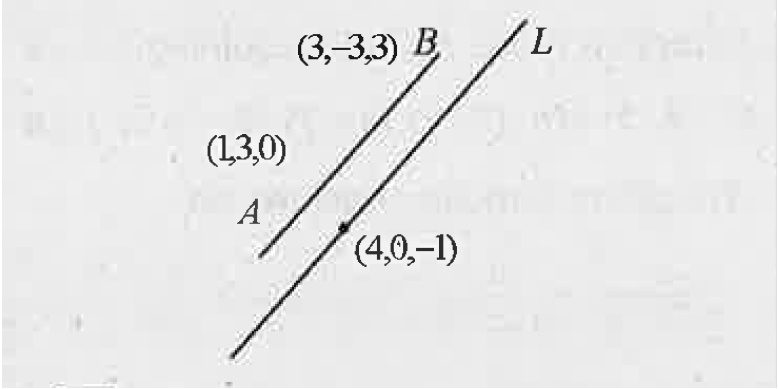
11. Consider two points A and B and a line L as shown in figure.

Find $\overline{AB}$



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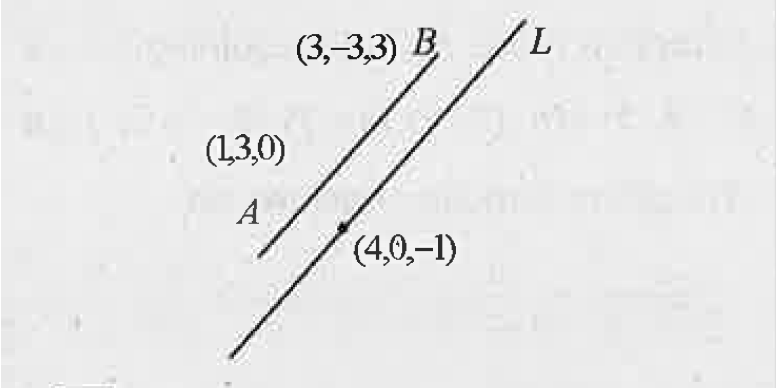
12. Consider two points A and B and a line L as shown in figure.

Find the Cartesian equation of the line L.



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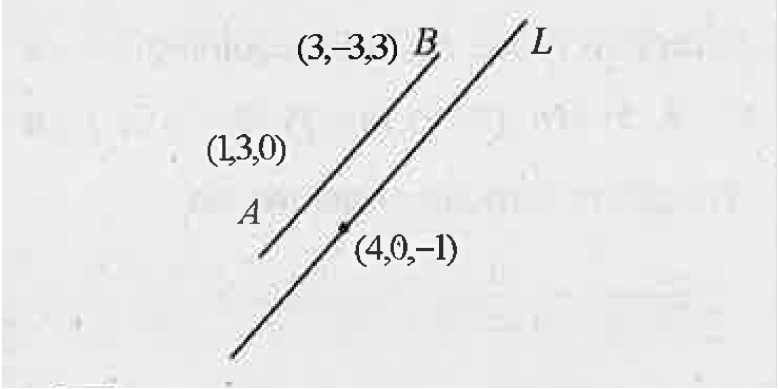
13. Consider two points A and B on L1 and a line L2 as shown in figure. `Find the foot of the perpendicular drawn from (2,3,4) on L1 to the

line L2.



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14. Cartesian equation of two lines are $\frac{x+2}{2}=\frac{y+2}{4}=\frac{z+2}{1}$, $\frac{x-1}{2}=\frac{y-1}{-3}=\frac{z-1}{-4}$.Write the vector equation of the lines.

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15. Cartesian equation of two lines are $\frac{x+2}{2}=\frac{y+2}{4}=\frac{z+2}{1}$, $\frac{x-1}{2}=\frac{y-1}{-3}=\frac{z-1}{-4}$.find the shortest distance between the lines.

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16. Consider the points P(1,3,4) &Q(-3,5,2) .Find the equation of the line passing through P and Q.

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17. Consider the points (1,3,4) &(-3,5,2). At which point that the above line cuts the plane $2x + y + z + 3 = 0$.

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18. Let the equation of a plane be $\bar{r}.\left(2\hat{i} - 3\hat{j} + 5\hat{k}\right) = 7,$ then find the Cartesian equation of the plane.

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19. Let the equation of a plane be $\bar{r}.\left(2\hat{i}-3\hat{j}+5\hat{k}\right)=7,$ then find the equation of a plane passing through the point (3,4,-1) and parallel to the given plane .

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20. Let the equation of a plane be $\bar{r}.\left(2\hat{i}-3\hat{j}+5\hat{k}\right)=7,$ then find the

equation of a plane passing through the point (3,4,-1) and parallel to the given plane .

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21. State the condition of the line $\bar{r} = \bar{a} + \lambda\bar{b}$ is parallel to the plane $\bar{r}.\bar{n} = d$.

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22. Show that the line $\bar{r} = i + j + \lambda(2i + j + 4k)$ is parallel to the

plane $\bar{r}.(-2i+k)=5$.

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23. Find the distance between the line $\bar{r}=i+j+\lambda(2i+j+4k)$ and the plane $\bar{r}.(-2i+k)=5$.

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24. If a line in the space makes angle α, β and γ with the coordinates axes, then

$\cos^2\alpha + \cos^2\beta + \cos^2\gamma$ is equal to a)1 b)2 c)0 d)3

A. 1

B. 2

C. 0

D. 3

Answer:

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25. The direction ratios of the line $\frac{x-6}{1}=\frac{2-y}{2}=\frac{z-2}{2}$ are a)6,-2,-2 b)1,2,2 c)6,1,-2 d)0,0,0

A. 6,-2,-2

B. 1,2,2

C. 6,1,-2

D. 0,0,0

Answer:

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26. If the vector equation of a line is

$\bar{r} = i + j + k + \mu(2i - 3j - 4k)$, then the Cartesian equation of the line is

A. $\frac{x+2}{2} = \frac{y+2}{4} = \frac{z+2}{1}$

B. $\frac{x-1}{2} = \frac{y-1}{-3} = \frac{z-1}{-4}$

C. $\frac{x+2}{1} = \frac{y+2}{4} = \frac{z+2}{1}$

D. `(x-1)/2=(y-1)/1=(z-1)/-4

Answer:

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27. If the Cartesian equation of a plane is $x + y + z = 12$, then the vector equation of the plane is.... a)$\bar{r}.\,(2i + j + k) = 12$ b) $\bar{r}.\,(i + j + k) = 12$

c)$\bar{r}.\,(i + j + 2k) = 12$ d)$\bar{r}.\,(i + 3j + k) = 12$

A. $\bar{r}.\,(2i + j + k) = 12$

B. $\bar{r}.\,(i + j + k) = 12$

C. $\bar{r}.\,(i + j + 2k) = 12$

D. $\bar{r}.\,(i + 3j + k) = 12$

Answer:

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28. Consider the lines

$\bar{r} = (i + 2j - 2k) + \lambda(i + 2j)$

and $\bar{r} = (i + 2j - 2k) + \mu(2j - k)$

Find the angles between the lines.

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29. Consider the lines

$\bar{r} = (i + 2j - 2k) + \lambda(i + 2j)$

and $\bar{r} = (i + 2j - 2k) + \mu(2j - k)$

Find a vector perpendicular to both the lines.

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30. Consider the lines

$\bar{r} = (i + 2j - 2k) + \lambda(i + 2j)$

and $\bar{r} = (i + 2j - 2k) + \mu(2j - k)$

Find the equation of the line passing through the point of intersection of lines and perpendicular to both the lines.

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31. Consider the line $\bar{r} = (2i - j + k) + \lambda(i + 2j + 3k)$. Find the Cartesian equation of the line.

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32. Consider the line $\bar{r} = (2i - j + k) + \lambda(i + 2j + 3k)$

Find the vector equation of the line passing through A (1,0,2) and parallel to the line.

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33. Consider the line

$\bar{r} = (2i - j + k) + \lambda(i + 2j + 3k)$

Write two points on the line obtained from vector equation of the line passing through A (1,0,2) and parallel to the line which are equidistant from A.

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34. Find the equation of the plane through the point (1,2,3) and perpendicular to the plane $x - y + z = 2$ and $2x + y - 3z = 5$

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35. Find the distance between the planes $x - 2y + 2z - 8 = 0$ and $6y - 3x - 6z = 57$

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36. Consider the Cartesian equation of line $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z-5}{-2}$ Find the vector equation of the line.

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37. Consider the Cartesian equation of line $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z-5}{-2}$

Find its intersecting point with the plane

$5x + 2y - 6z - 7 = 0$

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38. Consider the Cartesian equation of line

$$\frac{x-3}{2} = \frac{y+1}{3} = \frac{z-5}{-2}$$

Find the angle made by the line with the plane

$$5x + 2y - 6z - 7 = 0$$

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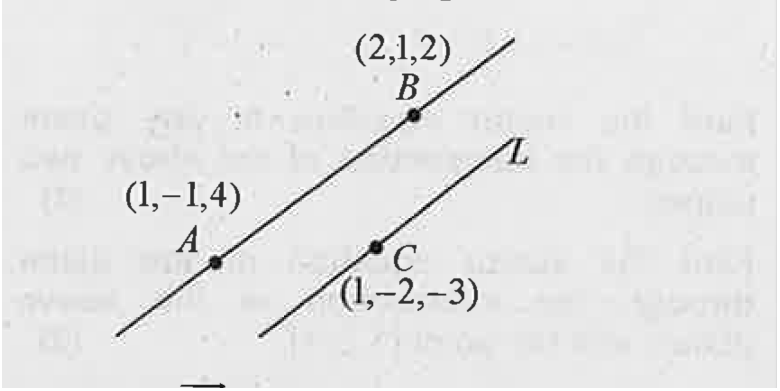
39. From the following figure

Find $\overrightarrow{AB}$



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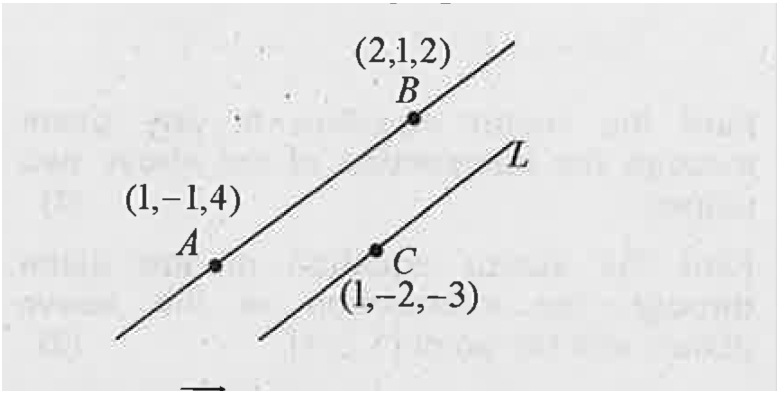
40. From the following figure

Find the vector equation of line L.



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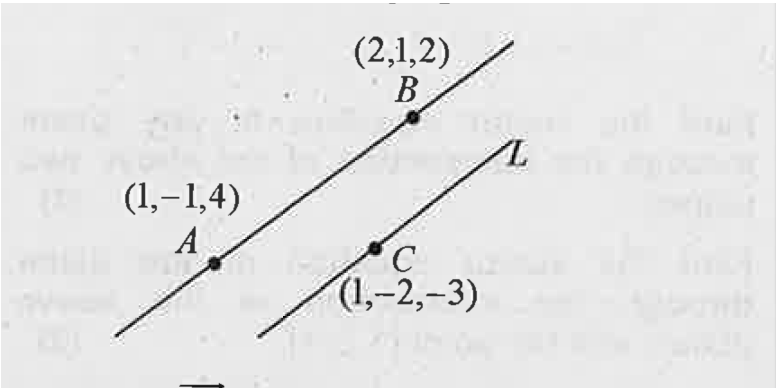
41. From the following figure

Find a point on line L other than C.



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42. Find the vector equation of the plane which is at a distance of $\frac{6}{\sqrt{29}}$ from the origin with perpendicular vector $2i - 3j + 4k$. Convert into Cartesian form. Also find the foot of the perpendicular drawn from the origin to the plane.

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43. Consider the Plane $\bar{r}.(-6i - 3j - 2k) + 1 = 0.$ find the

direction cosines perpendicular to the plane and perpendicular distance from the origin.

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44. Consider three points (6,-1,1), (5,1,2) and (1,-5,-4) on space. Find the Cartesian equation of the plane passing through these points .

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45. Consider three points (6,-1,1), (5,1,2) and (1,-5,-4) on space. Find directions ratios normal to the Planes

46. Consider three points (6,-1,1), (5,1,2) and (1,-5,-4) on space. Find a unit vector normal to the plane.

47. Consider a straight line through a fixed point with position vectors $2i-2j+3k$ and parallel to $i-j+4k$.

Write down the vector equation of the straight line.

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48. Consider a straight line through a fixed point with position vectors $2i-2j+3k$ and parallel to $i-j+4k$.

Show that the straight line is parallel to the plane $\bar{r}.(i+5j+k)=5$

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49. Consider a straight line through a fixed point with position vectors 2i-2j+3k and parallel to i-j+4k .

Find the distance between the line and plane $\bar{r}.(i+5j+k)=5$

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50. Consider the vector equation of two planes $\bar{r}.(2i+j+k)=3, \bar{r}(i-j-k)=4$

Find vector equation of any plane through the intersection of the above two planes.

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51. Consider the vector equation of two planes $\bar{r}.(2i+j+k)=3, \bar{r}.(i-j-k)=4$ Find vector equation of the plane through the intersection of the above planes and the point (1,2,-1).

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52. Distance of the point(0,0,1) from the plane $x + y + z = 3$ a)$\frac{1}{\sqrt{3}}$units b)$\frac{2}{\sqrt{3}}$units c)$\sqrt{3}$ units d)$\frac{\sqrt{3}}{2}$units

A. $\frac{1}{\sqrt{3}}$units

B. $\frac{2}{\sqrt{3}}$units

C. $\sqrt{3}$units

D. $\frac{\sqrt{3}}{2}$units

Answer:

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53. Find the equation of the plane through the line of intersection of the planes x+y+z=1 and 2x+3y+4z=5 which is perpendicular to x-y+z=0

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54. Consider a plane $\bar{r}.(6i-3j-2k)+1=0$

Find dc's perpendicular to the plane.

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55. Consider a plane

$\bar{r}.(6i - 3j - 2k) + 1 = 0$

Find a vector of magnitude 14 units perpendicular to given plane.

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56. Consider a plane $\bar{r}.(6i-3j-2k)+1=0$.Find the equation of a line parallel to the above vector and passing through the point (1,2,1).

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57. Consider the pair of lines whose equations are . $\frac{x-2}{2}=\frac{y-1}{5}=\frac{z+3}{-3}$ and $\frac{x+1}{-1}=\frac{y-4}{8}=\frac{z-5}{4}$

Write the direction ratios of the lines.

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58. Consider the pair of lines whose equations are . $\frac{x-2}{2}=\frac{y-1}{5}=\frac{z+3}{-3}$ and $\frac{x+1}{-1}=\frac{y-4}{8}=\frac{z-5}{4}$

Find the shortest distance between the above skew lines.

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59. Consider the pair of lines whose equations are . $\frac{x-2}{2}=\frac{y-1}{5}=\frac{z+3}{-3}$ and

$$\frac{x+1}{-1} = \frac{y-4}{8} = \frac{z-5}{4}$$

Find the angle between these two lines.

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60. Consider the pair of lines

$\bar{r} = 3i + 4j - 2k + \lambda(-i + 2j + k) \ldots L_1,$

$\bar{r} = i - 7j - 2k + \mu(i + 3j + 2k) \ldots L_2$

Find one point each on lines L_1 and L_2.

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61. Consider the pair of lines

$\bar{r} = 3i + 4j - 2k + \lambda(-i + 2j + k) \ldots L_1,$

$\bar{r} = i - 7j - 2k + \mu(i + 3j + 2k) \ldots L_2$

Find one point each on lines L_1 and L_2.

Find the distance between those points.

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62. Consider the pair of lines

$\bar{r} = 3i + 4j - 2k + \lambda(-i + 2j + k) \ldots L_1,$

$\bar{r} = i - 7j - 2k + \mu(i + 3j + 2k)....L_2$

Find the shortest distance between L_1 and L_2

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63. Consider the points A(2,2,-1), B(3,4,2) and C(7,0,6) Are A,B and C collinear? Explain.

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64. Consider the points A(2,2,-1), B(3,4,2) and C(7,0,6).Find the vector and Cartesian equation

of the plane passing these three points.

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65. Consider the points A(2,2,-1), B(3,4,2) and C(7,0,6).

Find the vector and Cartesian equation of the plane passing these three points.

Find the angle between the above plane and the line $\bar{r} = (i + 2j - k) + \lambda(i - j + k)$

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66. Consider three points on space (2,1,0), (3,-2,-2) and (3,1,7). Find the Cartesian equation of the plane passing through the above points.

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67. Consider three points on space (2,1,0), (3,-2,-2) and (3,1,7).Find the Cartesian equation of the plane passing through the above points.Convert the equation into vector form.

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68. Consider three points on space (2,1,0), (3,-2,-2) and (3,1,7)

Find the Cartesian equation of the plane passing through the above points.

find a unit vector perpendicular to the plane and also find the perpendicular distance of the plane from the origin..

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69. $\overline{OA} = i + 2j + 3k$

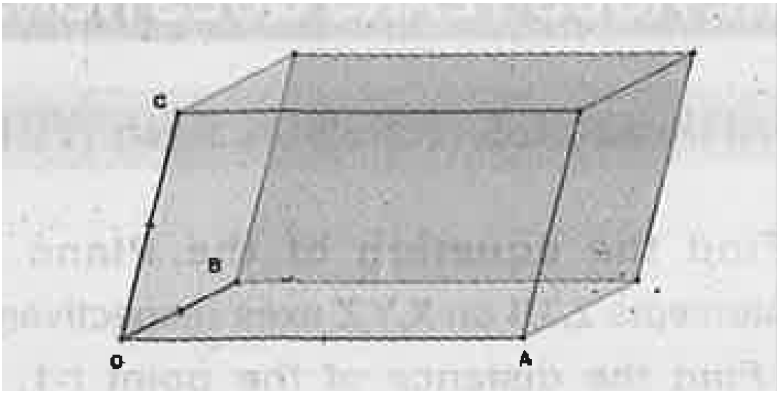
$\overline{OB} = i - 2j + 4k$

$\overline{OC} = 2i + 3j + k$

are adjacent sides of the parallelopiped.

Find the base area of the parallelopiped.

(Base determined by $\overline{OA}$ and $\overline{OB}$)



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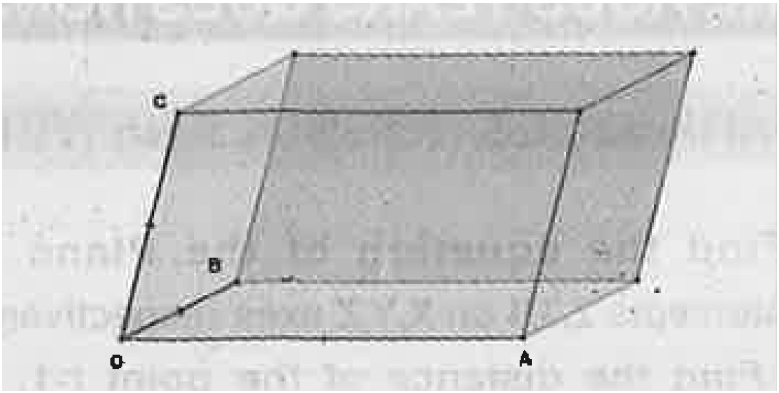
70. $\overline{OA} = i + 2j + 3k$

$\overline{OB} = i - 2j + 4k$

$\overline{OC} = 2i + 3j + k$

are adjacent sides of the parallelopiped.

Find the volume of the parallelopiped.



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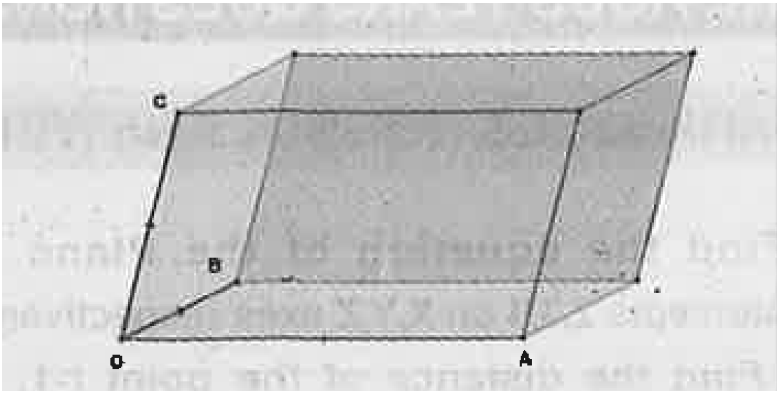
71. $\overline{OA} = i + 2j + 3k$

$\overline{OB} = i - 2j + 4k$

$\overline{OC} = 2i + 3j + k$

are adjacent sides of the parallelopiped.

Find the height of the parallelopiped.



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72. Find the equation of the line passing through the point (2,1,0) and (3,2,-1)

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73. Find the equation of the line passing through the point (2,1,0) and (3,2,-1)

Find the shortest distance of the line from the line

$$\bar{r} = (i - j + 2k) + \lambda(2i + j - 3k)$$

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74. The equation of two lines are $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x}{-3}=\frac{y}{2}=\frac{z}{5}$, then Find the dr's of the given lines.

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75. The equation of two lines are $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x}{-3}=\frac{y}{2}=\frac{z}{5}$, then Find the angle between the given lines.

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76. The equation of two lines are $\frac{x-1}{2}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x}{-3}=\frac{y}{2}=\frac{z}{5}$, then

Find the equation of the line passing through

(2,1,3) and perpendicular to the given lines.

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77. Find the direction cosine of the vector 2i+2j-k.

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78. Find the distance of the point (2,3,4) from the plane $\bar{r}.(3i-6j+2k)=-11$.

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79. Find the shortest distance between the lines $\bar{r} = (2i - j - k) + \lambda(3i - 5j + 2k)$ and $\bar{r} = (i + 2j + k) + \mu(i - j + k)$

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80. Find the equation of the Plane with intercepts 2,3,4 on X,Y,Z axes respectively.

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81. Find the distance of the point (-1,-2,3) from the Plane $\bar{r}.(2i-3j+4k)=4$

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82. Consider the points A(2,2,-1), B(3,4,2), C(7,0,6).Find AB.

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83. Consider the points A(2,2,-1), B(3,4,2), C(7,0,6).Find the Cartesian and vector equation of the plane passing through these points.

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84. Consider the points A(3,-4,-5) and B(2,-3,1) Find the vector and Cartesian equation of the line passing through the points A and B.

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85. Consider the points A(3,-4,-5) and B(2,-3,1)

Find the point where the line crosses the XY Plane.

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86. Find the Cartesian equation of the plane passing through the point (1,2,-3) perpendicular to the vector2i-j+2k .

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87. Find the Cartesian equation of the plane passing through the point (1,2,-3) perpendicular to the vector2i-j+2k .

Find the angle between the Plane and the line $\frac{x-1}{2}=\frac{y-3}{3}=\frac{z}{6}$

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88. Find the angle between the lines having direction ratios 1,1,2 and $\sqrt{3}-1, -\sqrt{3}-1, 4$

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89. If lines $\frac{x-1}{3}=\frac{y-1}{2\lambda}=\frac{z-3}{2}$ and $\frac{x-1}{3\lambda}=\frac{y-1}{1}=\frac{z-6}{-5}$ are perpendicular , find the value of λ

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90. Find the equation of the plane passing through the points (3,-1,2) , (5,2,4) ,(-1,-1,6)

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91. Find the equation of the plane passing through the points (3,-1,2) , (5,2,4) ,(-1,-1,6) .Find the perpendicular distance from the point (6,5,9) to this plane.

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92. Consider the vector equation of two planes

$\bar{r}.(2i+j+k)=3, \bar{r}(i-j-k)=4$

Find vector equation of any plane through the intersection of the above two planes.

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93. Consider the vector equation of two planes $\bar{r}.(2i+j+k)=3, \bar{r}.(i-j-k)=4$ Find vector equation of the plane through the intersection of the above planes and the point (1,2,-1).

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94. Consider the planes $2x+y-2z=5$ and $3x-6y-2z=7$.Find their normal vectors.

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95. Consider the planes

$2x + y - 2z = 5$ and

$3x - 6y - 2z = 7$

Find the angle between these two planes.

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96. If a_1, b_1, c_1 and a_2, b_2, c_2 are the direction ratios of two lines , then write the condition of

its perpendicularity.

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97. Find the angle between the lines

$$\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4} \text{ and } \frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}.$$

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98. Find the shortest distance between the lines $\bar{r} = i + j + \lambda(2i - j + k)$ and

$\bar{r} = 2i + j - k + \mu(3i - 5j + 2k)$

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99. The equation of the line which passes through the point (1,2,3) and parallel to the vector 3i+2j-2k is

A. $\bar{r} = 3i + 2j - 2k + \lambda(i + 2j + 3k)$

B. $\bar{r} = 2i - 5k + \lambda(3i + 2j - 2k)$

C. $\bar{r} = i + 2j + 3k + \lambda(-2i + 4j - 2k)$

D. $\bar{r} = i + 2j + 3k + \lambda(3i + 2j - 2k)$

Answer:

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100. Find the angle between the pair lines

$\bar{r} = 2i - 5j + k + \lambda(3i + 2j + 6k)$ and

$\bar{r} = 7i - 6k + \mu(i + 2j + 2k)$

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101. Consider the lines

$\frac{x-3}{2} = \frac{y-1}{5} = \frac{z+3}{4}$ and

$$\frac{x+5}{1} = \frac{y+2}{1} = \frac{z-3}{2}$$

Find the angle between them.

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102. Consider the lines $\frac{x-3}{2} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+5}{1} = \frac{y+2}{1} = \frac{z-3}{2}$

Find the shortest distance between them

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103. Find the vector equation of the Plane Passing through the intersection of the planes $\bar{r}.(i+j+k)=6$ and $\bar{r}.(2i+3j+4k)=-5$ and through the point (1,1,1).

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104. Express the vector equation $\bar{r}.(5i+3j+4k)=0$ of a Plane in Cartesian

form and hence find its perpendicular distance from the origin.

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105. Given the plane $5x-2y+4z-9=0$

Find the foot of the perpendicular drawn from the origin to the Plane.

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106. Given the plane 5x-2y+4z-9=0

Find the foot of the perpendicular drawn from the origin to the Plane.

write the vector and Cartesian equation of this perpendicular.

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107. The foot of the perpendicular from the origin to a plane is P(4,-2,5). Write $\overline{OP}$

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108. The foot of the perpendicular from the origin to a plane is P(4,-2,5). Write $\overline{OP}$

Find the equation of the plane in vector and Cartesian form.

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109. Consider the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ and $\frac{x+3}{3}=\frac{y+7}{2}=\frac{z-6}{4}$

Express the equation to the lines into vector form.

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110. Consider the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ and $\frac{x+3}{3}=\frac{y+7}{2}=\frac{z-6}{4}$

Find the shortest distance between the lines.

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111. Consider the Cartesian equation of a line

$$\frac{x-3}{2}=\frac{y+1}{3}=\frac{z-5}{-2}$$

Find its vector equation .

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112. Consider the Cartesian equation of a line

$$\frac{x-3}{2}=\frac{y+1}{3}=\frac{z-5}{-2}$$

Find the intersecting point with the plane

$$5x+2y-6z-7=0$$

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113. The foot of the perpendicular drawn from origin to a Plane is (4,-2,5).

How far is the plane from origin?

114. The foot of the perpendicular drawn from origin to a Plane is (4,-2,5).

Find a unit vector perpendicular to that Plane.

115. The foot of the perpendicular drawn from origin to a Plane is (4,-2,5).

Obtain the equation of the Plane in general form

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116. Equation of the plane with intercepts 2,3,4 on the x,y,z axis respectively is

A. $2x+3y+4z=1$

B. $2x+3y+4z=12$

C. $6x+4y+3z=1$

D. $6x+4y+3z=12$

Answer:

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117. Find the Cartesian equation of the plane passing through the point A(2,5,-3) , B(-2,-3,5) and C(5,3,-3).

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118. The distance of the plane x+y+z = 1 from the point (1,1,1) is

a)4 units b) $\frac{1}{\sqrt{3}}$ units c) $\frac{4}{\sqrt{3}}$ units d) $\frac{1}{4\sqrt{3}}$ units

A. 4 units

B. $\frac{1}{\sqrt{3}}$ units

C. $\frac{4}{\sqrt{3}}$ units

D. $\frac{1}{4\sqrt{3}}$ units

Answer:

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119. Find the equation of the plane passing through (1,0,-2) and perpendicular to each of the planes 2x+y-z=2 and x-y-z=3

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120. The lines x-1=y=z is perpendicular to the line.....a) $\frac{x-2}{1}=\frac{y-1}{2}=\frac{z}{-3}$ b)

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

d)x=y=z/2

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

B. $x-2=y-2=z$

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

D. x=y=z/2

Answer:

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121. Find the shortest distance between the lines $\bar{r} = i + 2j + 3k + \lambda(i + j + k)$ and $\bar{r} = i + j + k + \mu(i + j + k)$

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122. Find the shortest distance between the lines $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$ and $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$

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123. Find the equation of the Plane passing through one point (-1,3,2) and $\perp$ r to the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 0$

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124. A line makes equal angles with the coordinate axis . Find the direction cosines.

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125. Find the equation of the plane passing through (1,1,-1),(2,3,5) and (-1,4,-5).

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126. Find p and q , if the plane x+py+qz=0 is perpendicular to the plane 3x+2y+z=0 and the line $\frac{x-3}{2}=\frac{y-2}{3}=\frac{z-1}{1}$

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127. Given the straight linrs

$\bar{r} = 3i + 2j - 4k + \lambda(i + 2j + 2k)$ and

$\bar{r} = 5i - 2k + \mu(3i + 2j + 6k)$

Find the angle between the lines.

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128. Given the straight linrs

$\bar{r} = 3i + 2j - 4k + \lambda(i + 2j + 2k)$ and

$\bar{r} = 5i - 2k + \mu(3i + 2j + 6k)$

Obtain the unit vector perpendicular to both the lines.

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129. Given the straight lines

$\bar{r} = 3i + 2j - 4k + \lambda(i + 2j + 2k)$ and

$\bar{r} = 5i - 2k + \mu(3i + 2j + 6k)$

Form the equation of the line perpendicular to the given lines and passing through the point(1,1,1)

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130. Write the Cartesian equation of the straight line through the point (1,2,3) and along the vector 3i+j+2k

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131. Write the Cartesian equation of the straight line through the point $(1, 2, 3)$ and along the vector $3i + j + 2k$.Write a general point on this straight line.

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132. Write the Cartesian equation of the straight line through the point (1,2,3) and along the vector$3i + j + 2k$.Find the point of intersection of this straight line with the plane $2x + 3y - z + 2 = 0$

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133. Find the distance from (1,2,3) to the plane 2x+3y-z+2=0

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134. Consider a plane passing through the point (5,2,-4) and perpendicular to the line

$\bar{r} = (i + j) + \lambda(2i + 3j - k)$

Write the equation in Cartesian form.

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135. Consider a plane passing through the point (5,2,-4) and perpendicular to the line

$\bar{r} = (i + j) + \lambda(2i + 3j - k)$

Find its distance from the point (1,2,-1).

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136. Consider a plane passing through the point (5,2,-4) and perpendicular to the line

$\bar{r} = (i + j) + \lambda(2i + 3j - k)$

Find the angle made by it with line

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

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