MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

THREE DIMENSIONAL GEOMETRY

Question Bank

1. The number of lines making equal angles with coordinate axes is_____.

A. 1

B. 2

C. 4

D. 8

Answer:

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2. Fill in the blanks in the length of the projection of the line segment joining (1,3,-1) and (3,2,4)on z-axis is _____.

$[1, 3, 4, 5]$

A. 1

B. 3

C. 4

D. 5

Answer:

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3. If a line is perpendicular to z-axis and makes an angle measuring 60^0 with x-axis, then the angle it makes with y-axis measures____.

A. 30^0

B. 60^0

C. 90^0

D. 120^0

Answer: C

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4. If the distance between the points (-1, -1, z) and (1, -1, 1) is 2 then z =____.

A. 1

B. $\sqrt{2}$

C. 2

D. 0

Answer: A

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5. The line through $(1, -1, 2)$ and $(-2, -1, 2)$ is always perpendicular to z-axis.

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6. The line passing through $(0, 0, 0)$ and $(1, 2, 3)$ has direction cosines $(-1, -2, -3)$

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7. If l, m, n be there real numbers proportional to the direction cosines of L, then $p + m^2 + n^2 = 1$.

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8. If α, β, γ be any three arbitrary angles then $\cos\alpha, \cos\beta, \cos\gamma$ can always be considered as the direction cosines of a line.

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9. If two lines are perpendicular to a third line, then the direction ratios of the two lines are proportional.

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10. Show that the points (3,-2,4)(1,1,1) and (-1,4,-1) are collinear.

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11. Show that points (0,1,2),(2,5,8),(5,6,6) and (3,2,0) from a parallelogram.

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12. Find the co-ordinates of the foot of the perpendicular from the point $(1, 1, 1)$ on the line joining $(1, 4, 6)$ and $(54, 4)$.

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13. Find the co-ordinates of the point where the perpendicular from the origin meets the line joining the points $(-9, 4, 5)$ and $(11, 0, -1)$.

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14. Prove that the points P(3,2,-4),Q(5,4,-6) and R(9,8:-10) are collinear. Find the ratio in which the point Q divides the line segment PR.

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15. If P $(1, y, z)$ lies on the line through $(3, 2, -1)$ and $(-4, 6, 3)$ find y & z.

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16. If A, B, C, D are the points $(6, 3, 2), (3, 5, 7), (2, 3, -1)$ and $(3, 5, -3)$

respectively, then find the projection of $\overline{AB}$ on $\overleftrightarrow{CD}$

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17. The projection of a line segment $\overline{OP}$, through origin O, on the co-ordinate axes are 6, 2, 3. Find the length of the line segment OP and its direction cosines.

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18. The projection of a line segment of x, y and z-axis respectively are 12, 4, 3.Find the length and the direction cosines of the line segment.

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19. If A, B, C are the points $(1, 4, 2), (-2, 1, 2)$ and $(2, -3, 4)$ respectively then find the angles of the triangle ABC.

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20. Find the acute angle between the lines passing through $(-3, -1, 0), (2, -3, 1)$ and $(1, 2, 3), (-1, 4, -2)$ respectively.

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21. Prove the following by vector method. Measure of the angle between two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$

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22. Prove the angle between the diagonal of one of the faces of the cube and the diagonal of the cube intersecting the diagonal of the face of the cube is $\cos^{-1}\sqrt{\frac{2}{3}}$

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23. Find the angle which a double ordinate of length 2a subtends at its vertex and focus.

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24. Find the angle between the lines whose dcs. L, m, n are connected by the relation, $3l + m + 5n = 0$ and $6mn - 2nl + 5lm = 0$

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25. If l_1, m_1, n_1 and l_2, m_2, n_2 are the direction cosines of two mutually perpendicular lines show that

the d.cs. Of the line perpendicular to both of them are

$m_1n_2 - n_1m_2, n_1l_2 - l_1n_2, l_1m_2 - m_1l_2$

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26. State Ture or False .Through any four points one and only one plane can pass.

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27. State True or False . The equation of xy-plane is $x + y = 0.$

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28. The plane $ax + by + c = 0$ is perpendicular to z-axis.

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29. The equation of the plane parallel to xz-plane and passing through $(2, -4, 0) is y + 4 = 0.$

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30. State True or False .The planes $2x - y + z - 1 = 0$ and $6x - 3y + 3z = 1$ are coincident.

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31. State true or False .The planes $2x + 4y - z + 1 = 0$ and $x - 2y - 6z + 3 = 0$ are perpendicular to each other.

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32. The distance of a point from a plane is same as the distance of the point from any line lying in that plane.

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33. The equation of a plane passing through $(1, 1, 2)$ and parallel to $x + y + z - 1 = 0$ is_____

A. $x + y + z = 0$

B. $x + y + 2z - 1 = 0$

C. $x + y + z = 0$

D. $x + y + z = 4$

Answer: D

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34. The equation of plane perpendicular to z-axis and passing through $(1, -2, 4)$ is____

A. $x = 1$

B. $y + 2 = 0$

C. $z - 4 = 0$

D. $x + y + z - 3 = 0$

Answer: D

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35. The distance between the parallel planes $2x - 3y + 6z + 1 = 0$ and $4x - 6y + 12z - 5 = 0$ is____

A. $\frac{1}{2}$

B. $\frac{1}{7}$

C. $\frac{4}{7}$

D. $\frac{6}{7}$

Answer: A::B::C

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36. The plane $y - z + 1 = 0$ is____

A. parallel to x-axis

B. perpendicular to x-axis

C. parallel xy-plane

D. perpendicular to yz-plane

Answer: A::B::C::D

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37. A plane whose normal has direction ratios $< 3, -2, k >$ is parallel to the line joining (-1,1,- 4)

and (5,6,-2). Then the value of k =.....[6,-4,-1,0]

A. 6

B. -4

C. -1

D. 0

Answer: D

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38. Find the equation of planes passing throught the points $(6, -1, 1), (5,1,2)$ and (1,-5,-4)`

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39. Find the equation of planes passing throught the points $(2, 1, 3), (3, 2, 1)$ and $(1, 0, -1)$

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40. Find the equation of planes passing throught the points $(-1, 0, 1), (-1, 4, 2)$ and `(2,4,1)

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41. Find the equation of planes passing throught the points $(-1, 5, 4), (2, 3, 4)$ and $(2, 3, -1)$

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42. Find the equation of planes passing throught the points $(1, 2, 3), (1, -4, 3)$ and $(-1, 3, 2)$

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43. Find the equation of the plane .Passing through the point $(2, 3-1)$ and parallel to the plane $3x - 4y + 7z = 0.$

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44. Passing throughthe point $(2, -3, 1)$ and $(-1, 1-7)$ and perpendicular to the plane $x - 2y + 5z + 1 = 0$.

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45. Find the equation of the plane passing through the foot of the perpendiculars drawn from P(a,b,c) on the co-ordinate planes.

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46. passing through the point $(-1, 3, 2)$ perpendicular to the planes $x + 2y + 2z = 5$ and $3x + 3y + 2z = 8$.

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47. Bisecting the line segment joining $(-1, 4, 3)$ and $(5, -2, -1)$ at right angles.

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48. Find the equation of the plane Paralel to the plane $2x - y + 3z + 1 = 0$ and at a distance 3 units away

from it.

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49. Write the equation of the plane $3x - 4y + 6z - 12 = 0$ in intercept from and hence obtain the co-ordinates of the point where it meets the co-ordinate axes.

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50. Write the equation of the plane $2x - 3y + 5z + 1 = 0$ in normal from and find its

distance from the origin. Find also the distance between from the point (3,1,2).

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51. Find the distance between the parallel planes $2x - 2y + z + 1 = 0$ and $4x - 4y + 2z + 3 = 0$.

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52. In each of the following case, verift whether the four given points are coplanar or not. $(1, 2, 3), (-1, 1, 10), (2, 1, 3), (1, 1, 2)$

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53. In each of the following case, verift whether the four given points are coplanar or not. $(1, 1, 1), (3, 1, 2), (1, 4, 0), (-1, 1, 0)$

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54. In each of the following case, verift whether the four given points are coplanar or not. $(0, -1, -1), (4, 5, 1), (3, 9, 4), (-4, 4, 4)$

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55. In each of the following case, verift whether the four given points are coplanar or not. $(-6, 3, 2), (3, -2, 4), (5, 7, 3)$ and $(-13, 17, -1)$.

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56. Find the equation of the plane Passing through the intersection of planes $2x + 3y - 4z + 1 = 0.2x - y + z + 2 = 0$and passing through the point (3,2,1).

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57. Find the equation of the plane Which contains the line of intersection of the planes $x + 2y + 3z - 4 = 0$ and $2x + y - z + 5 = 0$ and perpendicular of the plane $5x + 3y + 6z + 8 = 0$.

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58. Find the equation of the plane Passing through the intersection of $ax + by + cz + d = 0$ and $a_1x + b_1y + c_1z + d_1 = 0$ perpendicular to xy-plane.

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59. Find the equation of the plane Passing through the intersection of the planes $x + 3y - z + 1 = 0$ and $3x - y + 5z + 3 = 0$ and is at a distance $2/3$units from origin.

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60. Find the angle between the following pairs of planes. $x + 3y - 5z + 1 = 0$ and $2x + y - z + 3 = 0$

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61. Find the angle between the following pairs of planes. $x + 2y + 2z - 3 = 0$ and $3x + 4y + 5z + 1 = 0$

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62. Find the angle between the following pairs of planes. $x + 2y + 2z - 7 = 0$ and $2x - y + z = 6$

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63. Find the equation of the bisector of the angles between the following pairs of planes and specify the

ones which bisects the acute angles , $3x - 6y + 2z + 5 = 0$ and $4x - 12y + 3z - 3 = 0$

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64. Find the equation of the bisector of the angles between the following pairs of planes and specify the ones which bisects the acute angles , $2x + y - 2z - 1 = 0$ and $4x - 12y + 3z + 3 = 0$

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65. Show that the origin lies in the interior of the acute angle between planes. $x + 2y + 2z + 9$ and

$4x - 3y + 12z + 13 = 0$, Find the equation of bisector of the acute angle.

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66. Prove that the line joining $(1, 2, 3), (2, 1, -1)$ intersects the line joining $(-1, 3, 1)$ and $(3, 1, 5)$.

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67. Show that the point $\left(-\frac{1}{2}, 2, 0\right)$ is the circumcentre of the triangle formed by the points $(1, 1, 0)(1, 2, 1)$ and $(-2, 2-1)$.

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68. Show that plane $ax + by + cz + d = 0$ divides the line segment joining (x_1, y_1, z_1) and (x_2, y_2, z_2) in a ratio $-\dfrac{ax_1 + by_1 + cz_1 + d}{ax_2 + by_2 + cz_2 + d}$

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69. A variable plane is at a constant distance p from the origin and meets the axes at A,B,C. Through A,B,C plane are drawn parallel to the co-ordinate planes. Show that the locus of their points of intersection is $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{1}{p^2}$.

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70. A variable plane passes through a fixed point (a,b,c) and meets the co-ordinate axes at A,B,C. Show that the locus of the point common to the planes drawn through A,B and C parallel to the co-ordinate planes is $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=1$

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71. The plane $4x+7y+4z+81=0$ is rotated through a right angle about its line of intersection with the plane $5x+3y+10z-25=0$. Find the equation of the plane in new position.

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72. The plane $lx + my = 0$ is rotated about its line of intersection with the plane z=0 through angle measure alpha. Prove that the equation of the plane in new position is $lx + my \pm z\sqrt{l^2 + m^2}\tan\alpha = 0$

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73. State which of the following statements are true (T) or false(F)

The line $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-1}{2}$ pass though the origin.

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74. State which of the following statements are true (T) or false(F)

The line $\frac{x+2}{-1}=\frac{y-3}{2}=\frac{z+4}{k}$ and $\frac{x-4}{-4}=\frac{y-3}{k}=\frac{z+1}{2}$ are perpendicular at value of k=-1.

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75. State which of the following statements are true (T) or false(F)

The line $\frac{x+5}{-2}=\frac{y-3}{1}=\frac{z-2}{3}$ lies on the plane x-y+z+1=0.

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76. State which of the following statements are true (T) or false(F)

The line $\frac{x-2}{3}=\frac{1-y}{4}=\frac{5-z}{1}$ is parallel to the plane 2x -y-2z=0.

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77. State which of the following statements are true (T) or false(F)

The line $\frac{x+3}{-1}=\frac{y-2}{3}=\frac{z-1}{4}$ is perpendicular to the plane 3x-3y+3z-1=0

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78. The line $\frac{x+2}{-4}+\frac{y-1}{5}=\frac{z-1}{3}$ and $\frac{1-x}{-4}=\frac{y-0}{5}=\frac{2-z}{3}$ are_____

A. parallel

B. perpendicular

C. coincident

D.

Answer: A::C::D

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79. The line passing through (-1,0,1) and perpendicular to the plane x+2y+1=0 is _____

A. $\frac{x+1}{1} = \frac{y-0}{2} = \frac{z-1}{2}$

B. $\frac{x+1}{1} = \frac{y}{2} = \frac{z-1}{0}$

C. $\frac{x-1}{1} = \frac{y-0}{2} = \frac{z-1}{0}$

D.

Answer: A::B

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80. The line $\frac{x+1}{2} = \frac{y-6}{1} = \frac{z-4}{0}$ is_____

A. parallel to x-axis

B. perpendicular to y-axis

C. perpendicular to z-axis

D.

Answer: perpendicular to z-axis

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81. If the line $\frac{x-3}{2} = \frac{y+k}{-1} = \frac{z+1}{-5}$ lies on the plane 2x-y+z-7 = 0,

then k = -$(2, -1, -2)$

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82. If l,m,n be d.cs, of a line ,then the line is perpendicular to the plane $x - 3y + 2z + 1 = 0$ if _____.

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83. Find the equation of lines joining the points. (4,-6,1) and (0,3,-1)

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84. Find the equation of lines joining the points. (a,a,a) and (a,0,a)

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85. Find the equation of lines joining the points. (2,1,3) and (4,-2,5).

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86. Write the symmetric form of equation of the following lines : x-axis

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87. Write the symmetric form of equation of the following lines : y = b, z = c

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88. Write the symmetric form of equation of the following lines : $ax + by + d = 0, 5z = 0$

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89. Write the symmetric form of equation of the following lines : $x - 2y = 3, 2x + y - 5z = 0,$

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90. Write the symmetric form of equation of the following lines :

$4x + 4y - 5z - 12 = 0 = 8x + 12y - 13z - 32,$

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91. Write the symmetric form of equation of the following lines : $3x - 2y + z = 1, 5x - 4y - 6z = 2.$

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92. Obtain the equation of the line through the point (1, 2, 3) and parallel to the line $x - y + 2z - 5 = 0, 3x + y + z = -6$

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93. Find the equation of the line through the point $(3, -1, 2)$ and parallel to the planes $x + y + 2z - 4 = 0$ and $2x - 3y + z + 3 = 0$

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94. Obtain the equation of the line through the point $(1, 2, -3)$ and perpendicular to each of the lines $x + 4y - 3z = 0 = 2x - 5y + 7$ and $y + 3z - 2 = 0 = x + 2z + 5$

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95. Show that the line passing through the points (a_1, b_1, c_1) and (a_2, b_2, c_2) passes through the origin , if $a_1a_2 + b_1b_2 + c_1c_2 = p_1p_2$. where p_1 and p_2 are distances of the points from origin.

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96. Prove that the lines $x = az + b, y = cz + d$ and $x = a_1z + b_1, y = c_1z + d_1$ are perpendicular if $aa_1 + cc_1 + 1 = 0.$

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97. Find the points of intersection of the line $\frac{x-1}{1} = \frac{y+2}{3} = \frac{z-1}{-1}$ and the plane $2x + y + z = 9.$

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98. Find the co-ordinates of the point where the line joining $(3, 4, -5)$ and $(2, -3, 1)$ meets the plane $2x + y + z - 7 = 0$.

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99. Find the distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{2} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$.

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100. Find the image of the point $(2, -1, 3)$ in the plane $3x - 2y + z - 9 = 0$

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101. Prove that the lines $\frac{x+4}{3} = \frac{y+6}{5} = \frac{z-1}{-2}$ and $3x - 2y + z + 5 = 0 = 2x + 3y + 4z - 4$ are co-planar.

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102. Show that the line joining the points $(0, 2, -4)$ and $(-1, 1-2)$ and the lines joining the points

$(-2, 3, 3)$ and $(-3, -2, 1)$ are co-plannr. Find their point of intersection.

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103. Proved that the line $\frac{x-1}{2} = \frac{y+2}{-3} = \frac{z-3}{1}$ lies on the plane $7x + 5y + z = 0$

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104. Find the angle between the plane $x + y + 4 = 0$ and the line $\frac{x+3}{2} = \frac{y-1}{1} = \frac{z+4}{-2}$.

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105. Find the angle betweenthe plane $4x + 3y + 5z - 1 = 0$ and line $\frac{x+3}{2} = \frac{y-1}{3} = \frac{z+4}{6}$

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106. Find the equation of the plane passing through the intersection of the planes $2x + y + 3z - 7 = 0$ and $2x + 5y + 3z - 9 = 0$ and the point (2,1,3).

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107. A line with direction ratios $< 2, 1, 2 >$ meets each of the lines $x = y + a = z$ and $x + a = 2y = 2z$. Find the co-ordinates of the points of intersection.

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108. Obtain the co-ordinates of the foot of the perpendicular drawn from the point $(3, -1, 11) \rightarrow thel \in ex/2=(y-2)/3=(z-3)/4$` Obtain the equation of the perpendicular also.

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109. Find the perpendicular distance of the point $(-1, 3, 9)$ from the line $\frac{x-13}{5} = \frac{y+8}{-8} = \frac{z-31}{1}$

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110. Find the distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$, measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$

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111. Find the distance of the point $(1, -1, -10)$ from the line $\frac{x-4}{1} = \frac{y+3}{-4} = \frac{z+1}{7}$ measured parallelto the line $\frac{x+2}{2} = \frac{y-3}{-3} = \frac{z-4}{8}$

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112. Find the equation of plane through the point $(2, 0, -3)$ and containing the line $3x + y + z - 5 = 0 = x - 2y + 4z + 4$

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113. Find the equation of the straight line perpendicular to the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-6}{7}$ and lyinng in the plane x - 2y + 4z - 51 = 0.

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114. Find the shortest distance between 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 also the equation of the line of shortest distance.

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115. Show that the shortest distance between the lines $x = y + 2a = 6z - 6a$ and $x + a = 2y = -12z$ is 2a .

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116. Find the equation in vector and Cartesian from of the plane passing through the point $(3, -3, 1)$ and norrmal to the line joining the points $(3, 4, -1)$ and $(2, -1, 5)$

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117. Find the vector equation of the plane whose Cartesian from of equation is $3x - 4y + 2z = 5$

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118. Show that the normals to the planes $\vec{r}.\left(\hat{i} - \hat{j} + \hat{k}\right) = 3$and $\vec{r}.\left(3\hat{i} + 2\hat{j} - \hat{k}\right) = 0$ are perpendicular to each other.

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119. Find the angle between the planes $\vec{r}.\left(2\hat{i} - \hat{j} + 2\hat{k}\right) = 6$and $\vec{r}.\left(3\hat{i} + 6\hat{j} - 2\hat{k}\right) = 9$

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120. Find the angle between the line $\vec{r} = \left(\hat{i} + 2\hat{j} - \hat{k}\right) + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$ and the plane $\vec{r}\left(2\hat{i} - \hat{j} + \hat{k}\right) = 4$

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121. Prove that the acute angle between the lines whose direction cosines are given by the relation $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$and $\frac{\pi}{3}$

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122. Prove that the three lines drown from origin with direction cosines $(l_1, m_1, n_1), (l_2, m_2, n_2), (l_3, m_3, n_3)$ are coplanar if $\begin{bmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ l_3 & m_3 & n_3 \end{bmatrix} = 0.$

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123. Prove that three lines drawn from origin with direction cosines proportional to $(1, -1, 1), (2, -3, 0), (1, 0, 3)$ lie on one plane .

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124. Determice k so that the lines joining the points $p_1(k, 1-, 1)$ and $P_2(2k, 0, 2)$ shall be perpendicular to the line from P_2 to $P_3(2+2k, k, 1)$.

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125. Find the angle between the lines whose direction ratios are proportional to a,b,c and b-c,c-a,a-b,.

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126. O is the origin and A is the point (a,b,c). Find the equation of the plane through A at right angles to

$\overrightarrow{OA}$.

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127. Find the equation of the plane through (6,3,1) and $(8, -5, 3)$ parallel to x-axls.

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128. Is the function [x] differentiable at x=2?

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129. Is the function [x] differentiable at x=2.5?

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130. Is the function [x] differentiable at x=0?

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131. Is the function [x] differentiable at x=2?

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132. If f(x) =| x |, what is the value of f(0-)?

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133. If the first derivative of a function vanishes at all points and if f(0) =1, then what is f(x)?

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134. Give example of a function which is continuous but not differentiable at x=1.

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135. Give example of a function whose is continuous but not differentiable at x=2.

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136. If f(x+y) = f(x) f(y) for all x,y and if f(5) = 2 and f(0) = 3, then what is the value of f '(5)?

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137. A differentiable function f defined for all x > 0 and satisfies $f\left(x^2\right) = x^3$ for all x > 0. What is the value f'(16) ?

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138. If f(x) = $\left[\tan^2 x\right]$, what is f ' (0)?

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139. If f(x) = $(3x+2)^{100}$ and f ' (x) = $n(3x+2)^{99}$ then what is the value of n ?

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140. If x $\in \left(\frac{3\pi}{4}, \pi\right)$ what is $\frac{dy}{dx}$ for y = | cos x | + | sin x | ?

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141. What is the derivative of f(In x) with respect to x where f(x) = In x ?

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142. If $f'(x) = \sqrt{2x^2 - 1}$ and $y = f\left(x^2\right)$ then what is $\frac{dy}{dx}$ at x = 1 ?

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143. Defferentiate

$\tan^{-1}\frac{2x}{1-x^2} w.r.t. \sin^{-1}\frac{2x}{1+x^2}$

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144. What is the differential co-efficient of $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x}$ with respect to $\tan^{-1}x$

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145. If $y = at^2$, x= 2at where a is a constant what is the value of $\frac{d^2y}{dx^2}$ at $x = \frac{1}{2}$?

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146. Is the function f(x)=$\sin^{-1}\frac{2x}{1+x^2}$ differentiable at $x = \pm 1$?

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147. Write the value of $\frac{d}{dx}\left(\sin^{-1}x + \cos^{-1}x\right)$ for $x \in (-1, 1)$.

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148. Write the value of $\frac{d}{dx}\sec^{-1}\left(\frac{1}{2x^2-1}\right)$, for $x \in \left(0, \frac{1}{\sqrt{2}}\right)$.

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149. Write the interval in which the fuction $f(x) = \sin^{-1}(1-x)$ is differentiable.

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150. Write the value x for which $\frac{d}{dx}\sin\left(\sin^{-1}x\right) = 1$

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151. Write the value x for which $\frac{d}{dx}\sin^{-1}(\sin x) = 1$

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152. Write the derivative of $\sec^{-1} x$ with respect to x at $x = -\frac{1}{3}$.

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153. Find the derivative of $In_x a$.

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154. Write a logarithmic functions which is differentiable atevery point in R.

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155. Give example of two functions which are not derivable at x = 0 , but their sum is derivable at x=0

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156. Write the value of x for which $\frac{d}{dx}\tan^{-1}\left(\frac{2x}{1-x^2}\right) = \frac{2}{1+x^2}$

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157. If $y = 5^t$ and $t = e^{3x}$. Write the value of $\frac{dy}{dx}$ at x= 0

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158. Write the derivative of $\sin^{-1} x$ with respect to $\cos^{-1}$x.

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159. Write the value of $\frac{dy}{dx}$ if $y = \sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \ldots \infty}}}$.

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160. Write the value of $\frac{dy}{dx}$ if $y = x^{x^{x^{\cdots\infty}}}$

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161. Write the value of $\frac{dy}{dx}$ at (1,0) where $x^2y + y^2 + x = 0.$

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162. Write the minimum value of y_2 where $y = \sin^2 x \cos^2 x$

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163. If x=log t, $y = t^2 - 1$, then what is y_2 at t=1 ?

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164. What is the slope of the tangent to the curve $y = 3x^2 + 2x - 1$ at x=2?

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165. If $y = \frac{1}{x(x+1)}$ then what is y_3?

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166. If $f(x) = e^{ax}$ sin ax and f"(0) = 2, then what is a ?

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167. A balloon is pumped at the tate of 10 cubic cm/min . What it the rate of increase of its radius when its radius is 15 cm ?

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168. For what values of a the function e^{ax} is increasing ?

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169. What is the interval in which $\log_5 x$ is increasing ?

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170. What is the interval in which $f(x) = x^3 - 3x^2 + 3x - 10$ is strictly increasing ?

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171. Give example of a function which is increasing in $(-\infty, 2)$ and $(3, \infty)$ and decreases in (2,3).

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172. Write the least value of a for which the function f defined by $f(x) = x^2 + ax + 1$ increases.

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173. For what value of K, Kf is increasing if f is increasing ?

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174. At what point of $x^2 = 2y$ the point (0,3) is nearest to the curve?

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175. If $\theta + \phi = \frac{\pi}{3}$, then for what value of a sin θ. Sin ϕ is maximum ?

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176. Write the absolute maximum and absolute minimum of the function $f(x) = \frac{x}{|x|}$ in $[-2, 2]$.

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177. Which condition of Rolle's theorem is violated by the functionf(x) = sin x in $\left[0, \frac{3\pi}{4}\right]$

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178. Which condition of Rolle's theorem is violated by the functionf(x) =| x | in [-1,1]

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179. Is there any tangent to the curve $y = |2x - 1|$ at $\left(\frac{1}{2}, 0\right)$?

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180. Write the subinterval of $(0, \pi)$ in which $\sin\left(x + \frac{\pi}{4}\right)$ is increasing.

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181. Given f(2) = 6, (1) =4 find $\lim_{h \to 0} \frac{f\left(2 + 2h + h^2\right) - f(2)}{f(1 + h - h^2) - f(1)}$

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182. If $(f(x))^n = f(nx)$, find $\frac{f'(nx)}{f'(x)}$.

Watch Video Solution

183. Evaluate $\frac{d}{dx}\left(a^{\sin x} + e^{-x}\right)$ by chain rule.

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184. If f(x) = sin |x| -|x| , find $f'\left(0^+\right)$

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185. Find the derivative of In $\sqrt{\frac{1-\cos x}{1+\cos x}}$.

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186. If $y = \cos^{-1}\left(\frac{a+b\cos x}{a+b\cos x}\right)$ find $\frac{dy}{dx}$.

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187. If $y = \tan^{-1}(\cot x) + \cot^{-1}(\tan x)$, find $\frac{dy}{dx}$.

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188. If $y = \tan^{-1}\left(\frac{3x - x^3}{1 - x^2}\right)$, find $\frac{dy}{dx}$.

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189. If $x = a\left(\frac{1 + t^2}{1 - t^2}\right), y = \frac{2t}{1 - t^2}$ find $\frac{dy}{dx}$ at $t = \frac{1}{\sqrt{3}}$.

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190. If $x = a\cos^{30}\theta, y = b\sin^{30}\theta,$ find $\frac{dy}{dx}$.

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191. If $y = e^{x^{e^x}}$, find $\frac{dy}{dx}$.

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192. If $x^y + y^x = 1$, find $\frac{dy}{dx}$.

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193. If $e^x + e^y = e^{x+y}$, find $\frac{dy}{dx}$.

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194. If $x^y y^x = 1$, find $\frac{dy}{dx}$.

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195. Find the derivative of $\tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right)$ with respect to $\cos^{-1} x$.

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196. Find $\frac{d^2y}{dx^2}$ if x=a $\cos\theta$, $y = b\sin\theta$.

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197. If $y = e^{ax}\sin bx$ show that $y_2 - 2ay_1 + (a^2 + b^2)y = 0$.

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198. If $x^7y^3 = (x+y)^{10}$, then find $\frac{d^2y}{dx^2}$

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199. If $u = f\left(\frac{x^2+y^2}{x}y\right)$ prove that $x\frac{\partial u}{\partial v} + y\frac{\partial u}{\partial y} = 0.$

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200. If f(x+y)=f(x).f(y) forall x,y and f(5)=2 and f'(0)=3, then show that f'(5)=6.

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201. If (fog) (1)=3, g(1) = 2, g(1) = 1,then show that f(2)=3.

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202. If f(a)= 2, f'(a) = 1, g(a)=-1 and g'(a)=2, then find $\lim_{x \to a} \frac{g(x)f(a) - g(a)f(x)}{x - a}$.

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203. Find the rate of change of the area of circle w.r.t.r when r=8 cm.

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204. The side of a sqart is increasing at the rate of 0.1 $cm/\sec$ and at the same time the area is increasing at the rate of 30 sq. $cm/\sec$. Find the length of side of the square.

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205. A particle moves along a straight line according to the law $s = t^3 - 3t^2 + 5t$. Find its velocity and acceleration at the end of 1 sec.

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206. Show that the function $f(x) = \frac{1}{x}$ is decreasing in $(0, \infty)$.

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207. Find the intervals where the function $f(x) = x^3 - 12x + 10$ is increasing.

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208. Find the slope of the normal to the curve $y = xe^{-x}$ at x=2.

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209. Find the angle between the tangents to the curve $y = x^2 - 5x + 6$ at the points (2,0) and (3,0).

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210. Find the point on the curve $y^2 - x^2 + 2x - 1 = 0$ where the tangent is parallel to the x - axis.

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211. Find the points on the curve $9y^2 = x^2$, where normal to the curve makes equal intercepts with axes.

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212. If $y = x^4 - 12$ and if x changes from 2 to 1.99, find the approximate error in y.

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213. Using differential find the value of $\sqrt{16.2}$.

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214. Show that $f(x) = x^3 - 6x^2 + 24x + 4$ has neither a maximum nor a minimum value.

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215. Find the points where $f(x) = 8x^2 - x^4 - 4$ has local maximum or minimum.

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216. Find the absolute maximum and absolute minimum value of the function $f(x) = 2x^3$ in [-2,2].

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217. Find the absolute maximum and absolute minimum value of $f(x) = x - x^3$ in [0,1].

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218. Using mean value theorem, prove that sin $x < x, \in (0. \pi/2)$.

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219. Write antiderivative of $\tan^2 x$

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220. Write the vale of $\int x a^{x^{2+1}} dx$

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221. Write the vale of $\int \sqrt{1-\cos 2x} dx$

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222. If f'(x)= $e^x + \frac{1}{1+x^2}$, what is f(x) ?

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223. Write the value of $\int e^{\log \cot^2 x} dx$

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224. Write the value of $\int \frac{e^x - 1}{1 - e^{-x}} dx$

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225. Write the value of $\int \frac{e^x - 1}{1 - e^{-x}} dx$

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226. Write the value of $\int x^{20} \sec^2 x dx - \int x^{20} \tan^2 x dx$

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227. Write the value of $\int \frac{\sec^2 x}{\cos ec^2 x} dx.$

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228. Write the value of $\int \frac{1}{\sqrt{x} e^{\sqrt{x}}} dx$

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229. Write the primitive of $\sin^3 x$

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230. Write the primitive of $\sin^3 x$

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231. Write the value of $\int e^x e^{e^x} e^{e^{e^x}} dx$.

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232. Write the value of $\int \frac{d\left(x^2+1\right)}{x^2+5}$.

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233. Write the value of $\int \frac{d\left(x^2+1\right)}{1+x^4}$dx

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234. Write the value of $\int x \sec^2 x dx$.

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235. Write the value of $\int e^{-x}(1-\tan x)\sec x dx\Big)$.

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236. Write the value of $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx.$

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237. Write the value of $\int e^x(In\sin x + \cot x)dx.$

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238. $\int \sin^{-1}\sqrt{\frac{x}{a+x}}dx =$ _____.

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239. $\int \tan^{-1}\left(\frac{x-5}{1+5x}\right)dx =$ _____.

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240. $\int \tan^{-1}\sqrt{x}dx =$ _____.

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241. $\int e^{\cos 2x} \sin 2x \, dx =$_____.

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242. $\int \frac{dx}{e^x + e^{-x}} =$ _____.

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243. Write the value of $\int \frac{1}{x(Inx)} dx$

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244. Write the value of $\int \frac{x\left(5x^3+4x^2+3x\right)}{x^5+x^4+x^3+1} dx.$

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245. Write the value of $\int \frac{dx}{x^{1/5}\left(1+x^{4/5}\right)^{1/2}}.$

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246. Write the value of `int({f(x)phi(x)+f(x)phi(x)}{logphi(x)+iogf(x)})/(f(x)phi(x))dx.

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247. Write the value of A if $\int \frac{dx}{(x+1)(x+2)} = A\log|x+1| - \log|x+2| + C$

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248. Write the value of $\int \frac{\cos x - \sin x}{\sin x + \cos x} dx.$

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249. Write the value of $\int \frac{1}{1+\sin^2 x} dx$.

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250. $\int_{-\pi/2}^{\pi/2} (\sin|x| - \cos|x|) dx =$ _____.

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251. $\int_{-\pi/6}^{x/3} \frac{dx}{1+\sqrt{\tan x}} dx =$ _____

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252. $\int_0^{x/2} \frac{\sin x - \cos x}{1 + \sin x . \cos x} = \_\_\_\_\_$

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253. $\int_{-1}^{1} e^{|x|} dx = \_\_\_\_\_$

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254. $\int_0^2 |2x - 1| dx = \_\_\_\_\_$

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255. $\int_{-1}^{1} \log \frac{4-x}{4+x} dx =$ _____

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256. If $f(0) = 1, f(2) = 3, f'(2) = 5,$ then the value of $\int_{0}^{1} x f''(2x) dx =$ _____.

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257. $\int_{0}^{\pi/2} \log \tan x dx$_____.

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258. If F(x)= $\int_0^x e^{2t}\cos 5t dt$, what is F'(x)?

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259. write the value of $\frac{d}{dx}\int_0^{x^2}\sin t dt$

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260. Write the value of $\lim_{x\to 0}\left[\frac{d}{dx}\left(\int_0^x \sqrt{1+t^2 dt}\right)\right]$.

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261. Write the value of $\int_{-1}^{1} \left(\sin^5 x + x\right) dx$.

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262. Write the value of $\frac{d}{dx} \int_{0}^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

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263. If $f(3 - x) = f(x)$, then $\int_{1}^{2} x f(x) dx =$ _____.

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264. $\lim_{x \to 0} \frac{\int_0^x \sec^2 t dt}{x \sin x} =$

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265. $\int_0^1 x(1-x)^n dx$

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266. $\int_0^{\frac{3}{2}} [2x] dx$

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267. $\int_0^{\pi} \cos^2 x dx =$ _____`

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268. Area under the curve $x + y = 1$ in the first quadrant is_____`

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269. The value of $\int_1^2 [f\{g(x)\}]^{-1} f'\{g(x)\}g'(x)dx$ for $g(1) = g(2) is$ _ _ _

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270. If f(x) is a quadratic polynomial such that $f(0) = 2, f'(0) = -3$ and f'(0)=4, then $\int_{-1}^{1} f(x)dx =$ _____`

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271. The value of $\int_{0}^{\pi/2} [\cos x]dx =$ _____`

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272. If $\int_0^a f(x)dx = \lambda$ and $\int_0^a f(2a-x)dx = \mu$ then $\int_0^{2a} f(x)dx =$ _____`

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273. Evaluate $\int \{2x+1)\left(x^2+x+1\right)^{10}dx$

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274. Evaluate $\int \left\{\frac{e^{2\log x}+e^{3\log x}}{x+x^2}\right\}dx.$

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275. Evaluate

$$\int\left[\cos^{-1}\left(\frac{1-\tan^2 x}{1+\tan^2 x}\right)+\sin^{-1}\left(\frac{2\tan x}{1+\tan^2 x}\right)\right]dx.$$

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276. Evaluate $\int\frac{1-\cos 2x}{1+\cos 2x}dx.$

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277. Evaluate $\int\frac{1}{\sin^2 x\cos^2 x}dx.$

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278. If $f'(x) = e^x + \frac{1}{1+x^2}$ and $f(0) = 1$, then find f(x).

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279. Evaluate $\int 2^{\cos 2x} \sin 2x dx$.

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280. Evaluate $\int \frac{\sin x}{\cos(x-a)} dx$.

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281. Evaluate $\int\left(1+\frac{1}{\tan x}\right)dx$

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282. Evaluate $\int\frac{\cos 4x+\cos 2x}{\sin 4x+\sin 2x}dx.$

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283. Evaluate $\int\tan x\sec^4 x dx.$

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284. Evaluate $\int \frac{x^9}{x^{20}+4} dx$

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285. Evaluate $\int \frac{3x+4}{x^2+4} dx.$

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286. Evaluate $\int \frac{\cos 3x . \cos x}{1+\cos 2x} dx.$

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287. Integrate $\int \frac{x^5}{x^2+1} dx$

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288. $\int \frac{2x+5}{(x+2)^{\frac{7}{2}}} dx$

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289. Integrate $\int \tan^{-1} x dx.$

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290. $\int \sec\theta \tan\theta \sqrt{\tan^2\theta - 3} d\theta$

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291. Evaluate $\int \frac{1}{x + x^{1/3}} dx.$

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292. Evaluate $\int (6x + 1)\sqrt{3x + 4} dx.$

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293. If $\int \frac{x}{(x-1)(2x-1)} = \int \left[\frac{A}{x-1} + \frac{B}{2x-1}\right] dx$

find A and B.

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294. Evaluate $\int \frac{1}{2\sin x + 3\cos x} dx.$

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295. Evaluate $\int \cos^4 x dx.$

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296. Evaluate $\int \frac{\cos 2x}{\sin 7x \cos 5x} dx.$

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297. Evaluate $\int \frac{\sec^2 \theta}{\cos 2\theta + 2\sin^2 \theta} d\theta$

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298. Evaluate $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx.$

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299. Evaluate $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx.$

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300. Evaluate $\int \frac{\sin^{-1}x}{(1-x^2)^{3/2}}dx.$

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301. $\int \sin^{-1}\sqrt{\frac{x}{a+x}}dx = \_\_\_\_\_.$

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302. Evaluate $\int \frac{\sqrt{\tan x}}{\sin x \cos x}$.

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303. Evaluate $\int_0^1 \frac{x^2}{x^2+1} dx$.

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304. Evaluate $\lim_{x \to 0} \frac{\int_0^{x^2} \sin \sqrt{t} dt}{x^3}$.

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305. Evaluate $\int_0^{\pi/2} x \sin x dx.$

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306. Evaluate $\int_{-1}^{3} \{|x| + [x]\} dx.$

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307. Evaluate $\int_{-3}^{3} |x + 1| dx.$

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308. $\int_0^{10} \sin(x - [x])\pi dx$

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309. If f(x)= $\int_1^{x^2} \tan^{-1}\sqrt{t}dt, t > 0$, find f' (1).

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310. $f(x) = \frac{1}{x^2}\int_2^x \left[t^2 + f(t)\right]dt,$ find f (2)

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311. If $f(x) = \cos x - \int_0^x (x-1) f(t) dt$, then find $f''(x) + f(x)$.

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312. Evaluate $I = \int_0^4 [\sqrt{x}] dx$.

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313. Evaluate $\int_0^{\pi/2} \frac{\cos x dx}{(2 - \sin x)(3 + \sin x)}$.

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314. Evaluate $\int_0^5 \sqrt{25 - x^2 dx}$

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315. Evalaute $\int_3^6 \frac{\sqrt{x}}{\sqrt{9 - \times} + \sqrt{x}}$ dx.

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316. Evaluate $\int_3^{\pi/2}$ In cot x dx.

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317. Find the area bounded by the curve $x = y^2$ and the straight lines x = 0, y = 1.

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318. Find the area bounded by the curve y = sin x between x = 0 and $x = 2\pi$.

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319. Find the area of the parabola $y^2 = 36x$ bounded by its latus rectum.

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320. Find the area of the region bounded by $y = 6x - x^2$x-axis and between ordinates x = 0 and x = 6.

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321. Find the area of the trapezium bounded by the sides $y = x, x = 0, y = 3, y = 4$.

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322. Write the order and degree of the differential equations given by : $\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^4 + y = 0$

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323. Write the order and degree of the differential equations given by : $\left\{y + \left(\frac{dy}{dx}\right)^3\right\}^{1/2} = 1 + x$

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324. Write the order and degree of the differential equation given by : $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{4}{3}}$

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325. Write the order and degree of the differential equation given by : $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}} = 1 + \left(\frac{dy}{dx}\right)^5$

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326. The degree of the differential equation satisfying $\sqrt{1-x^2} + \sqrt{1+y^2} = a(x-y)$ is____.

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327. Write the differential equation corresponding to $v = \frac{a}{r} + b$ is_____.

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328. The differential equation of $y = a\cos 2x + b\sin 2x$ is _____.

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329. The differential equation of the family of straight lines parallel to x-axis is ____.

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330. The differential equation of the family of straight lines passing through origin is____.

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331. The differential equation of the family of parabolas with axis along x-axis is____.

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332. Write the differential equation whose general solution is $y = ce^{2x}$

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333. Write the differential equation of parabolas $y^2 = 8x + c$

Watch Video Solution

334. Write the differential equation whose general solution is $y = a\cos 3x + b\sin 3x$

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335. Write the general solution of the differential equations : $\frac{dy}{dx} = \cos x - x$

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336. Write the general solution of the differential equations : $\frac{dy}{dx} = \frac{2}{s^2}$

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337. Write the general solution of the differential equations : $\frac{dy}{dx} = \cot^2 y$

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338. Write the general solution of the differential equations : $\frac{dy}{dx} = 4x^3 + 2x + \sec^2 x$

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339. Write the general solution of the differential equations : $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$

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340. Write the general solution of the differential equations : $\frac{d^2y}{dx^2} = 0$

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341. Write the general solution of the differential equations : $\frac{d^2y}{dx^2} = x$

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342. Write the solution $\frac{d^2y}{dx^2} = 0, y(0)$ and y'(0) = 1.

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343. Write the solution of $\frac{d^2y}{dx} = 2x, y = 2$ when x = 1.

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344. Write the general solution of $\frac{ydx - xdy}{y} = 0.$

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345. Write solution $\sqrt[3]{4 + \frac{dy}{dx}} = 2.$

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346. Write solution $\frac{dy}{dx} = \frac{1}{1 + x^2}, x = 0, y = 1$

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347. Write solution of $\frac{dy}{dx} = 2y, y(0) = 2$

Watch Video Solution

348. Write solution of $\frac{dy}{dx} = \frac{2}{y}, y(0) = 0$

Watch Video Solution

349. Write the solution of $ydx - xdy = x^2ydx.$

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350. Write integrating factor of $\left(1+y^2\right)dx+xdy=\tan^{-1}ydy$

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351. Find the solution of $\frac{dy}{dx}=e^x\sin x$

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352. Find the solution of $\frac{dy}{dx}=\frac{y}{x}$.

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353. Find integrating factor of $(x + \tan y)$ dy = tan ydx

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354. Find integrating factor of $(x - \text{In}y)\frac{dy}{dx} = -y\text{In}y.$

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355. Solve $e^{-2x}\frac{dy}{dx} = x.$

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356. Solve $\frac{dy}{dx} = x + y$

Watch Video Solution

357. Solve $\frac{dy}{dx} = \frac{x + y + 1}{x + y + 2}$.

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358. Find the equation of the curve whose slope is given by $\frac{dy}{dx} = \frac{2y}{x}$ and which passes through (1,1).

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359. If $y + \frac{dy}{dx} = 0$ and y(0) = 2, find y.

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360. Find differential equation of the curve $y = ae^{3x} + be^{5x}$.

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361. Write the projection of the point (1,2,3) on xy-plane.

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362. Write the projection of the point (2,3,1) on y-axis is.

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363. Write the image on the point (2,1,3) with respect to yz-plane.

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364. Write the distance of the point (3,1,5) from y-axis.

Watch Video Solution

365. A line is perpendicular to xy-plane Write the angle made by the line with z-axis.

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366. If the distance between the points (1,2,z) and $(-1, 2, 1)$ is 3, then find z.

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367. If the direction angles of a line are $\alpha = 30^\circ$ and $\beta = 60^\circ$, find the other direction angle γ

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368. Write the direction cosine of the line whose direction ratios are {1,2,3}.

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369. Write the direction cosines of the line joining (1,2,3) and (1,1,2).

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370. Write the distance of the point (1,1,2) from x-axis.

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371. Write the distance of the point (2,3,6) from zx-plane.

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372. Write the locusof a point p which moves in space such that its distance from origin is 4 units.

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373. Write the centroid of the triangle with vertices (1,2,3), (2,1,2), (3,0,1).

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374. Write the ratio in which the line joining the points (2,3,4) and $(-3, 5, -4)$ is divided by yz-plane.

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375. Write the value of y so that the points (1,y,2), (3,2,-1) and $(-4, 6, 3)$ are collinear.

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376. Write the projection of the line segment joining the points (2,1,3) and (3,2,4) on z-axis.

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377. Write the projection of the line segment joining (2,4,3) and (3,2,4) on yz-plane.

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378. If d.c.s. of a line be $\left(\frac{1}{2}, \frac{3}{4}, \frac{k}{4}\right)$ what is the value of k ?

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379. If α, β, γ be direction angles of a line, what is the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$.

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380. Write the direction cosines of the normal to the plane $x - y + 1 = 0$.

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381. Write the equation of the plane passing through the point (1,2,3), the direction ratios of the normal to

the plane being $\langle 3, 5, 7 \rangle$

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382. Write the value of x-intercept of the plane $x + y + 2z = 1$.

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383. The equation $ax + by + c = 0$ represents a plane parallel to____axis.

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384. Write the equation of the plane parallel to x-axis having intercepts 5 and 6 on y and z-axis respectively.

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385. The plane having equation $2x + 5z + 1 = 0$ is parallel to____plane.

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386. What is the distance from orgin of the plane $3x + 4y = 1$.

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387. Write the equation of the plane passing through (1,2,3) and parllel to the plane $x + 2y + 5z = 0$.

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388. Write the distance between the plane $x - 2y + z = 6$ and $2x - 4y + 2z = 8$

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389. Write the equation of the plane through origin and passing through the intersection of the planes $3x - 2y + z - 1 = 0$ and $x - 2y + 3z - 1 = 0$

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390. Write the position of the points A $(2, 4, -3)$ and B (2,-6,2) with respect to the plane 4x+7y+6=0

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391. Write the equation of the plane $3x - 4y + z + 5 = 0$ in normal form.

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392. Write the equation of the plane $x + 3y - 7z + 2 = 0$ in the intercept from.

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393. Write the equation of the plane passing through x-axis and y-axis.

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394. Write the equation of the plane perpendicular to z-axis and passing through `(1,-2,4).

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395. If the plane $2x + 4y + z + 2 = 0$ and $x - 2y + kz + 5 = 0$ are perpendicular to each other what is the value of k ?

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396. Write down the equation of x-axis.

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397. Write the vector equation of a line through the point (1,2,3) and parallel to the vector $3\hat{i} + 2\hat{j} - 2\hat{k}$

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398. Write the equation of the line passing through the points $(3, -2, -5)$ and `(3,-2,6).

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399. Write the equation of the line $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$ in vector form.

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400. Write the equation of the line in symmetric form through the point $(1, -2, 3)$ having direction ratios $(3, -4, 5)$.

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401. Write the equation of the line $x = ay + b, z = cy + d$ in symmetric from.

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402. Write the equation of the plane passing through the point (2, 3, 1) and perpendicular to the line.

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

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403. What is the number of independent constants that occur in the general equation of a plane.

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404. The angle between the planes $x+y+z+1=0$ and $2x+y+z+2=0$ is____.

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405. The angle between the plane $3x + 3z - 5 = 0$ and the line $\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z-3}{0}$ is.

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406. If the lines $\frac{x-1}{k} = \frac{y-3}{2} = \frac{2-z}{-5}$ and $\frac{x-1}{3} = \frac{2-y}{-4} = \frac{z}{k}$ are perpendicular to each other, then what is the value of k ?

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407. Find the equation of the plane passing through the intersection of the planes

$\_ r^{-} = \left(\hat{i} + \hat{j} + \hat{k}\right) = 1$ and

$\_ r^{-} = \left(\hat{2}i + \hat{3}j + \hat{k}\right) + 4 = 0$ and parallel to x=axis.

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408. Find the co-ordinates of the foot of the perpendicular drawn from the point (1,3,4) to the line joining the points $(3, 0, -1)$ and $(0, 1, -2)$.

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409. If the points (-1,-1,2), (2,m,5) and (3,11,6) are collinear, then find the value of m.

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410. Two vertices of a tringle are (1,2,3) and $(3, -2, 7)$ and centroid is(2,1,-2). Find the remaining vertex of the tringle.

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411. Show that the points (1,2,3), (2,3,1) and (3,1,2) from an equilateral triangle.

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412. Find the direction cosines of the line segment joining $(1, -1, 2)$ and (2,1,1).

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413. Find the projection of the line segment joining (1,2,3) and (2,3,4) on a straight line having d.r.s $\langle 2, 1, 3 \rangle$.

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414. If P,Q,R,S are points (1,2,5), $(-2, 1, 3)$, (4,4,2) and $(2, 1, -4)$ respectively, find the projection of PQ on

RS.

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415. If A,B,C are points (0,4,1), `(2,3,-1),), (4,5,0) find the angle that AB makes with BC.

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416. Find the acute angle between the lines whose d.rs are (1, 1, 2) and $\left(\sqrt{3}-1,\ -\sqrt{3}-1, 4\right)$ respectively.

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417. Find the equation of the plane passing through the points (2,1,3), (3,2,1) and $(1, 0, -1)$.

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418. Find the equation of the plane parallel to z-axis and with intercepts 3 and 4 on x and y axes respectively.

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419. Find the equation of the plane through the point $(-1, 3, 0)$, which is perpendlcular to both the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$.

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420. Find the equation of the plane if the point $(5, -3, 4)$ is the foot of the perpendicular drawn from origin to the plane.

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421. Find the equation of a plane which is at a distance 3 units from the origin and which is normal to the vector $2\hat{i} + 3\hat{j} - 6\hat{k}$.

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422. Find the components of the unit vector perpendicular to the plane $r^{\rightarrow}\left(2\hat{i}+3\hat{j}-6\hat{k}\right)-6=0$

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423. Writing the equation of the plane $3x-2y+z+2=0$ in normal form find its distance from origin.

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424. Find the angle between the planes $x + 2y + 3z + 1 = 0$ and $3x + 2y + z + 2 = 0$

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425. Find the equation of the plane through the point (2,1,0) and passing through the intersection of the planes $3x - 2y + z - 1 = 0$ and $x - 2y + 3z - 1 = 0$

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426. Find the position of the points $(1, 2, -1)$ and $(2, -1, 3)$ with respect to the plane $x + 3y + z + 1 = 0$.

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427. Find the intercepts of a plane $3x + 4y = 7z = 84$ on co-ordinate axes.

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428. Find the equation of the plane through the points (1,1,0), `(-2,2,1) and (1,2,1).

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429. Find the equation of the plane passing through the points $(1, -1, 1)$ and $(1, 1, -1)$ and perpendicular to xy-plane.

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430. A plane meets the co-ordinate axes at A,B,C such that the centroid of ΔABC is $(2, -2, 3)$. Find the equation of the plane.

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431. Find the equation of the plane through the feet of the perpendlcular drawn from P(2,3,5) on co ordinate planes.

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432. Find equation of a plane through $(2, -3, 1)$ and perpendlcular to the line joining the points $(3, 4, -1)$ and (2,-1,5)`.

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433. Find the equation of a plane biscting the line segment joining $(-1, 4, 3)$ and $(5, -2, -1)$ at right angle.

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434. Find the equation of planes parallel to the plane $6x - 3y - 2z + 5 = 0$ and at a distance 2 units from origin.

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435. Find the point where the line $\frac{x-2}{1}=\frac{y}{-1}=\frac{z-1}{2}$ meets the plane $2x+y+z=2$.

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436. If the points $(-1,3,2),(-4,2,-1)$ and $(5,5,\lambda)$ are collinear, find λ.

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437. Find the angle between the plane $x+y+z-2=0$ and line

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

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438. Find the equation of the plane passing through the point (2,3,1) and perpendlcular to the line $\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z+1}{2}$

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439. Find the image of the point $(3, -2, 1)$ in the plane $x - y + 3z = 2$.

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440. Find the equation of the plane passing through the line $\frac{x-8}{3}=\frac{y+19}{-16}=\frac{z-10}{7}$ and the point $(1, 2, -4)$.

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441. Find the length of the perpendicular from (2,0,1) on the line $x=y=z$.

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442. Find the equation of the line through $(-1, 0, 1)$ and perpendicular to the plane $x+2y+1=0$.

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443. Show that the lines $\frac{x+3}{2} = \frac{y+5}{3} = \frac{z-7}{-3}$ and $\frac{x+1}{4} = \frac{y+1}{5} = \frac{z+1}{-1}$ are co-planar.

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444. Show that the plane $2x - y - 2z - 4 = 0$ touches the shpere $x^2 + y^2 + z^2 + 2x - 6y + 1 = 0.$

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445. Find the equation of the sphere concentric with the sphere $x^2 + y^2 + z^2 + 4x - 6y + 8z - 5 = 0$ and passing through origin.

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446. Find equation of the sphere whose centre is $(2, -3, 4)$ and which passes through the point $(1, 2, -1)$.

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447. Find equation of the sphere with centre $(3, 6, -4)$ and touching the plane $2x - 2y - z - 10 = 0$.

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448. Find equation of the sphere passing through the points (0,0,0), (2,0,0), (0,3,0) and (0,0,4).

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449. If one end of a diameter of a sphere $x^2 + y^2 + z^2 - 4x - 2y + 2z - 30 = 0$ is $(4, 5, -5)$

find the other end.

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450. Find the equation of the sphere on the join of (2,3,5) and $(4, 9, -3)$ as ends of diameter.

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451. If the vectors $\_a^{\rightarrow} = 2\hat{j} - 3\hat{k}$ and $\_b^{\rightarrow} = 2\hat{j} + a\hat{j} + 6\hat{k}$ are parallel, white the value of α.

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452. If $\left|\alpha \overrightarrow{a}\right| = 2$, what is the value of α?

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453. If the position vectors of two points A ans B are $3\hat{i} + 2\hat{j} + \hat{k}$ and $2\hat{i} - 5\hat{j} + 4\hat{k}$ respectively, what is the magnitude of $\overrightarrow{AB}$?

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454. Given position vectors of P and Q, as $(1, 0, -2)$ and

$(3, -2, 0) respectively, w\hat{i} stheunit \longrightarrow rparal \leq l \rightarrow$

oversetrarr(PQ)` ?

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455. Given co-ordinates of the points A and B as $(-1, -2)$ and $(-5, -6)$ respectively, what is the magnitude of $\overrightarrow{AB}$?

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456. Write the unit vectors parallel to the vector $3\hat{i} + \hat{j} - 2\hat{k}$.

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457. Find the direction cosines of the vectors, $\overrightarrow{r_1} - \overrightarrow{r_2}$ whaere $\overrightarrow{r_1} = \hat{i} + \hat{j} + \hat{k}$ and $\overrightarrow{r_2} = 2\hat{i} + \hat{j} + 2\hat{k}$.

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458. Are the points A (2,6,3), B (1,2,7) and $(3, 10, -1)$ collinear?

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459. What is the angle between the vectors $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}$ and $\overrightarrow{b} = 2\hat{i} - \hat{j} + \hat{k}$

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460. What is the scalar product of the vectors $\vec{a} = 2\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$

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461. What is the scalar projection of the vector $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ on $\vec{b} = 2\hat{i} + 2\hat{j} - \hat{k}$

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462. What is the vector projection (component) of the vector $\vec{a} = 2\hat{i} + \hat{j} - \hat{k}$ on $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$

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463. What is the unit vector perpendlcular to each of the vectors $\hat{i} + \hat{j}, \hat{j} + \hat{k}$?

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464. What is the area of the parallelogram whose sides are vectors $2\hat{i} + \hat{j}$ and $2\hat{j} + \hat{k}$?

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465. The area of the triangle with vertices (2,0,0), (0,1,0) and (0,0,3) is____.

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466. If the vectors $\hat{i}+2\hat{j}+\hat{k}$ and $2\hat{i}+3\hat{j}+\alpha\hat{k}$ are perpendicular, then what is α?

Watch Video Solution

467. If the vectors $\alpha\hat{i}+3\hat{j}+\hat{k}$ and $2\hat{i}+\hat{j}+\hat{k}$ are perpendicular, what is α

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468. If $\vec{a} = \hat{i} - 2\hat{j}, \vec{b} = \hat{j} + \hat{k}$, what is the component of $\vec{a}$ perpendicluar to $\vec{b}$

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469. If $\left|\vec{a}\right| = 10, \left|\vec{b}\right| = 1$ and $\vec{a} . \vec{b} = 0$, then $\left|\vec{a} \times \vec{b}\right| =$ _____.

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470. If $\vec{a} . \vec{b} = 0$ and $\vec{a} \times \left(\vec{b} \times \vec{c} \right) = \vec{0}$ then $\vec{a} . \vec{c} = ?$

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471. If two vectors $\vec{a}$ and $\vec{b}$ are such that $\left| \vec{a} + \vec{b} \right| = \left| \vec{a} - \vec{b} \right|$, then what is the angle between $\vec{a}$ and $\vec{b}$?

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472. If $\left[\vec{a} \, \vec{b} \, \vec{c} \right] = 10$, what is the value of $\left[\vec{a} + \vec{b}, \vec{b} + \vec{c}, \vec{c} + \vec{a} \right]$?

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473. If $\vec{a} = 4\hat{i} + n\hat{j} + 3\hat{k}\left|\vec{a}\right| = 13$, what is the value of n ?

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474. If $\left[\vec{a}\,\vec{b}\,\vec{c}\right] = 5$, then what is $\left[\vec{a} \times \vec{b}\,\vec{b} \times \vec{c}\,\vec{c} \times \vec{a}\right]$?

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475. What is the value of x of the vectors $3\hat{i}-7\hat{j}-4\hat{k}, 3\hat{i}-2\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+x\hat{k}$

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476. If $\left(\vec{a}+\vec{b}\right)\left(\vec{a}-\vec{b}\right)=12$ and $\left|\vec{a}\right|=2\left|\vec{b}\right|$ then what is $\left|\vec{a}\right|$

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477. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a}+\vec{b}+\vec{c}=0$, then what is the vlue of $\vec{a}\,\vec{b}+\vec{b}\,\vec{c}+\vec{c}\,\vec{a}$?

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478. If θ is angle between $\vec{a}$ and $\vec{b}$ and $\left|\vec{a} \times \vec{b}\right| = \left|\vec{a}\,\vec{b}\right|$ Then θ equal to?

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479. If $\vec{a} = 2\vec{j}$ and $\vec{c} = -3\vec{j}$ what is the angle between $\vec{a}$ and $\vec{c}$?

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480. Show that the points A,B,C with position vectors $\vec{i} + 2\vec{j} + 3\vec{k}$, $2\vec{i} + 11\vec{j} - 4\vec{k}$ and $-7\vec{j} + 10\vec{k}$ are co-planer.

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481. Find a vector in the direction of the vector $\vec{a} = 5\hat{i} - \hat{j} + 2\hat{k}$ which has magnitude 8 units.

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482. Write the values of m and n for which the vectors $(m-1)\hat{i} + (n+2)\hat{j} + 4\hat{k}$ and

$(m+1)\hat{i}+(n-2)\hat{j}+8\hat{k}$ are parallel

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483. Find the magnitude of $\vec{a}+\vec{b}-2\vec{c}$ where $\vec{a}=(2,3,4)\ \vec{b}=(1,-1,2)$ and $\vec{c}=(1,0,3)$

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484. Show that the vectors $\hat{i}+\hat{j}-2\hat{k}, \hat{i}-2\hat{j}+\hat{k}$ and $2\hat{i}-\hat{j}-\hat{k}$ are the sides of an equilateral triangle.

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485. If $\vec{a} = (2, 3, 6), \vec{b} = (2, -2, 1), \vec{c} = (-1, 0, 2)$ find the direction cosines of $\vec{b} - \vec{a} + 2\vec{c}$.

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486. If the sum of two unit vectors is a unit vectors find the magnitude of their difference.

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487. Show that the vectors $3\hat{i} - 4\hat{j} - 4\hat{k}, 2\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} - 3\hat{j} - 5\hat{k}$ from a right angled tringle.

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488. Find the value of k for which A (1,0,3), B`(-1,2,4), C(1,2,1) and D(k,2,5) are coplaner.

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489. Find the scalar components of the unit vector which is perpendicular to the vectors $\hat{i}+2\hat{j}-\hat{k}$ and $3\hat{i}-\hat{j}+2\hat{k}$.

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490. Find a unit vector perpendicualr to each of the vectors $\left(\vec{a}+\vec{b}\right)\left(\vec{a}-\vec{b}\right)$ where $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=2\hat{i}+3\hat{k}$

Watch Video Solution

491. Find the vector of magniltude 5 units and parallel to the resultant of the vectors $\vec{a}=2\hat{i}+3\hat{j}-\hat{k}$ and $\vec{b}=\hat{i}-2\hat{j}+\hat{k}$ then find the angle between $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$.

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492. If $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$ then find the angle between

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493. State True or False.The region given by $2x + 5y \geq 1$ is a bounded region.

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494. State True or False .The region $x + 2y \leq 8, 2x + y \leq 8$ and $x \geq 0, y \geq 0$ is unbounded.

Watch Video Solution

495. The feasible region $x + y \geq 0, 2x + y \leq 0$ is a bounded set.

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496. (1,5) is a pointin the region $2x - y \geq 4, 2x + 5y \leq 2$

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497. The minimum value of $2x + 5$ subject to $3x - 1 \geq 1$ is____.

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498. Shade the feasible region for the inequations $2x + 3y \leq 6, x \geq 0, y \geq 0$ in a rough figure.

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499. Find the feasible region satisfying the inequation $2x + y \leq 4, x \geq 0, y \geq 0.$

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500. For the LPP:

Maximize $z = 5x_1 + 7x_2$

subject to $x_1 + x_2 < 4$

$3x_1 + 8x_2 \leq 24.$

$10x_1 + 7x_2 \leq 35.$

$x \geq 0, y \geq 0.$

Examine whether $\left(\frac{10}{3}, \frac{11}{5}\right)$ is a feasible solution or not.

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501. Find the feasible solution for the system $x + y \geq 1, 2x + y \leq 4, x \geq 0, y \geq 0.$

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502. Is the number set $\{0.2, -0.5, 0.9, 0.4\}$ determining a probability distribution ?

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503. Does the number set $\{0.6, 0.5, 0.9, 0.1\}$ give a probability distribution ?

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504. If a die is rolled twice and X is the sum of scores obtained is greater than 10, then find $P(X < 10)$.

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505. If X be a random variable which takes the values 0,1,2,..... with probabilities $P(X = i) = cp^1, 0 < p < 1$, then find c if X is a probability distribution.

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506. If `{0.1,0.2,c,0.5} determines a probability distribution, find c.

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507. An unbiased die is thrown twice. What is the probability distribution of the number of sixes ?

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508. A fair coin is tossed repeatedly. If tails appear on first four tosses, what is the probability of head appearing on the fifth toss ?

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509. If two cards are drawn at random from a desk of cards, and X be the number of aces obtained, what is E(X) ?

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510. What is the variance of X, given as follows : For the given data :

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511. A die is thrown 5 times. If getting an even number is a success, what is the probability of 3 successes ?

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512. The standard deviation of a binomial distribution $(p+q)^{16}$ is 2. Find its mean.

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513. The maximum value of variance in binomial distribution with parameters n and p is____.

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514. A binomial distribution has mean 5 and variance 4. Find the number of trials.

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515. A die is thrown 15 times. Getting a number greater than 5 is a success.Find the mean and variance of the number of successes ?

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516. The probability of an event happening in one trial of an ecperiment is 0.6. Three independent trials are made. Find the probability that the event happens at least once.

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517. Two dice are tossed 6 times. Find the probability that 7 will show an exactly four of the tosses.

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518. If X-following a Binomial distribution with parameter n=6 and p, and if 4 P(X=4)=P(X=2) find p.

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519. A cartoon contains 20 bulbs, 5 of which are defective. Find the probability that if a sample of 3 bulbs is chosen at random from the cartoon 2 will be defective.

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520. An unbiased coin is tossed n times. Let X denote the number of times head occurs.If p(X=4), p (X=5) and (x=6) are in A.P. then find the value of n.

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521. An experiment succeede twice as often as it fails. Find the probability that in the next six trials there are at least 4 success.

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522. Find the expectation of the number of tails in 15 tosses of a coin.

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523. If the sum of the mean and the variance of a binomial distribution for 5 trials is 1,8, find the distribution.

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