MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE SCANNER (TEXTUAL BITS)

Exercise

1. Determine x so that 2 is the slope of the line through P (2 , 5) and Q (x , 3) . (AS_1)

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2. Find the value of y, if the line joining (3,y) and (2,7) is parallel to the line joining the points (-1,4) and (0,6).

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3. Find the condition for the points (a,0),(h,k) and (0,b) when $\neq 0$ to be collinear.

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4. Find the equation of the straight line passing through $(-4, 5)$ and cutting off equal intercepts on the coordinate axes.

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5. Find the equationof the straight line passing through the point (-2,4) and making intercepts, whose sum is zero

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6. Transform the equation $2x - 3y + 6 = 0$ into Normal form

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7. Find the value of a it the area of the triangle formed by the liners x=0,y=0,3x+4y=a is 6 sq units.

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8. Find the distance between the parallel to the lines 5x-3y-4=0,10x-6y-9=0

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9. Find the equationof the straight line parallel to the lines $2x + 3y + 7 = 0$ and passing through the point (5,4).

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10. Find the value of p if the equation of the straight lines x+p=0,y+2=0,3x+2y+5=0 are concurrent.

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11. Find the distance,between the parallel lines 3x+4y-3=0,6x+8y-1=0.

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12. Find the value of p,if the straight lines 6x-10y+3=0,kx-5y+8=0 are parellel.

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13. Find the value of p, if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.

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14. Find the value of k, if the straight lines $y-3kx+4=0$ and $(2k-1)x-(8k-1)y-6=0$ are perpendicular.

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15. Find the equation of the straight line passing through A(-1,3) and (i) parallel (ii) perpendicular to the straight line passing through B(2,-5),C(4,6)

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16. Find the equation of the line passing through the points (1,-1) and (2,3).

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17. Find the equation of the straight line perpendicular to the line 5x-3y+1=0 and passing through the point (4,-3).

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18. Prove that the point (1,11),(2,15),(-3,-5) are collinear and find the equation of the straight line containing

them.

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19. Prove that the points $(a, b+c), (b, c+a)$ and $(c, a+b)$ are collinear and find the equation of the straight line containing them .

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20. Find the equation of the straight line, which make 150° with the X-axis in the positive direction

and which pass through the point (-2, -1).

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21. Find the equation of the straight line, which make 135° with the X-axis in the positive direction and which pass through the point (3,-2).

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22. Find the equation of the straight line, which make $\pi/4$ with the X-axis. y = x in the positive direction and which pass through the point (0,0)

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23. The angle made by a straight line with the positive X-axis in the positive direction is 150° and Y-intercept cut off by it is 2. Find the equation of the line.

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24. Find the equation of the straight line with inclination $\theta = \tan^{-1}\left(\frac{2}{3}\right)$ and y - intercept 3.

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25. Find the angle made by the straight line $y = -\sqrt{3}x + 3$ with the positive direction of the X-axis measured in the counter-clock wise direction.

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26. Find the angle which the straight line $y = \sqrt{3}x - 4$ makes with the Y-axis.

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27. Find the equation of the straight line passing through the point (2,3) and making intercepts,

whose sum is zero.

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28. Find the equation of the straight line passing through the ponts $(3, -4)$ and making X and Y-intercepts which are in the ratio $2:3$

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29. Find the equation of the straight line passing through the origin and making equal angles with the co-ordinate axes.

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30. Transform the equation $2x + y = 3$ into

(i) slope intercept form

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31. Transform the equation $\sqrt{3x} + y = 4$ into

(i) Slope intercept form

(ii) Intercept form

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32. Transform the equation $\sqrt{3}x + y = 4$ into Normal form

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33. Transform the equation $x + y + 1 = 0$ into (i) slope intercept form

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34. Transform the equation $x + y + 1 = 0$ into (ii) intercept form

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35. Transform the equation of $x + y + 1 = 0$ into

Normal form

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36. Transform the equation $3x + 4y + 12 = 0$ into

(i) intercept form

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37. Transform the equation of $x + y + 1 = 0$ into Normal form

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38. Transformation the equation $4x - 3y + 12 = 0$ into (i) slope intercept form (ii) intercept form

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39. Transform the equation $4x + 3y - 12 = 0$ into intercept form.

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40. Find the sum of the square of the intercepts of the line $4x - 3y = 12$ on the axes of co-ordinates.

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41. If the product of the intercepts made by the straight line $x \tan\alpha + y \sec\alpha = 1, \left(0 \leq \alpha \leq \frac{\pi}{2}\right)$, on the co-ordinates axes is equal to $\sin\alpha$, find α.

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42. A straight line passing through $A(-2, 1)$, makes an angle of 30° with the positive direction of the X-axis. Find the points on the straight line whose distance from A is 4 units.

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43. A straight line passing through $A(1, -2)$ makes an angle $\frac{\tan^{-1} 4}{3}$ with the positive direction of the X-axis in the anticlock wise sense. Find the point on the straight line whose distance from A is 5 units.

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44. Find the area of the triangle formed by the line $3x - 4y + 12 = 0$ with the coordinate axes.

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45. Find the ratio in which the straight line $5x - 6y - 21 = 0$ divides the line joining the points $(4, -1)$ and $(2, 1)$

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46. Find the ratio in which (i) the X -axis.

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47. Find the ratio in which (ii) the Y-axis divide the line segment AB joining the points A (2, -3) and B(3, -6).


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48. Find the ratio in which the straight line $2x + 3y - 5 = 0$ divides the line joining the points (0,0) and (-2,1).


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49. Find the ratio in which the straight line $5x - 6y - 21 = 0$ divides the line joining the points $(4, -1)$ and $(2, 1)$

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50. State whether the points $A(3, 2), B(-4, -3)$ lie on the same side or opposite sides of the line $2x - 3y + 4 = 0.$

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51. State whether the points $A(2, -1), B(1, 1)$ lie on the same or opposite sides of the line $3x + 4y = 6.$

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52. Find the point of concurrence of the set of lines

$(2 + 5k)x - 3(1 + 2k)y + (2 - k) = 0$

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53. Find the point of concurrence of the set of lines

$(k + 1)x + (k + 2)y + 5 = 0$

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54. Find the angle between the lines $2x + y + 4 = 0$ and $y - 3x = 7$

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55. Find the angle between the lines $ax + by = a + b, a(x - y) + b(x + y) = 2b$

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56. Find the angle between the lines $y = -\sqrt{3}x + 5, y = \frac{1}{\sqrt{3}}x - \frac{2}{\sqrt{3}}$

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57. Find the equation of the straight line passing through the points $\left(at_1^2, 2at_1\right), \left(at_2^2, 2at_2\right)$.

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58. Write the equations of the straight lines parallel to X-axis and (i) at a distance of 3 units above the X-

axis.

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59. Write the equations of the straight lines parallel to X-axis and (i) at a distance of 4 units below the X-axis.

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60. Write the equations of the straight lines parallel to Y-axis and (i) at a distance of 2 units from the Y-axis to the right of it.

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61. Write the equations of the straight lines parallel to Y-axis and (i) at a distance of 5 units from the Y-axis to the left of it.

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62. If the portion of a straight line intercepted between the axes of co-ordinates is bisected at $(2p, 2q)$, write the equation of the straight line.

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63. The intercepts of a straight line on the axes of co-ordinates are a and b.

If p is the length of the perpendicular drawn from the origin to this line. Write the value of p in terms of a and b.

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64. Find the equation of the straight line whose distance from the origin is 4, if the normal ray form the origin to the straight line makes an angle of 135° with the positive direction of the X-axis.

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65. A straight line whose inclination with the positive direction of the X-axis measured in the anti-clockwise sense is $\pi/3$ makes positive intercept on the Y-axis. If the straight lie is at a distance of 4 from the origin, find its equation.

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66. Find the equation of the straight line passing through the point of intersection of the lines $x + y + 1 = 0$ and $2x - y + 5 = 0$ and containing the point $(5, -2)$.

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67. If a,b,c are arithmetic progression then show that the equation $ax + by + c = 0$ represents a family of concurrent lines and find the point of concurrency.

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68. If $3a + 2b + 4c = 0$ then show that the equation $ax + by + c = 0$ represents a family of concurrent straight lines and find the point of concurrency.

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69. Find the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1,(a \neq \pm b)$

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70. Find the equation of the straight line passing through the points $(-1,2)$ and $(5,-1)$ and also find the area of the triangle formed by it with the axes of coordinates.

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71. Find the set of values of a if the points $(1, 2)$ and $(3, 4)$ lie to the same side of the straight line $3x - 5y + a = 0$

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72. $(-4, 5)$ is a vertex of a square and one of its diagonals is $7x - y + 8 = 0$. Find the equation of a the other diagonal.

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73. Find the incentre of the Δ^{le} with the vertices $\left(1, \sqrt{3}\right)$,(0,0) and (2,0)

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74. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making intercept -4 on X-axis.

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75. Find the angle between the lines $\sqrt{3} + y + 1 = 0$ and x + 1 = 0`

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3 D Geometry

1. Find the coordinates of the vertex 'C' of ΔABC if its centroid is the origin and the vertices A,B are (1,1,1) are (-2,4,1) respectively.

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2. If (3,2,-1),(4,1,1) and (6,2,5) are three vertices and (4,2,2) is the centroid of a tetrahedro, find the fourth vertex to that tetrahedron.

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3. Find the fourth vertex of the parallelogram whose consecutive vertices are $(2, 4, -1), (3, 6, -1)$ and $(4, 5, 1)$.

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4. Find the ratio in which YZ-plane divides the line joining A (2,4,5), B(3,5,-4).

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5. S.T The points are collinear

(i) $(1, 2, 3), (7, 0, 1), (-2, 3, 4)$

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6. S.T The points are collinear

(ii) A(3,-2,4), B(1,1,1),C(-1,4,-2)

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7. Find distance between the points (5, -1, 7) and (8,5,1)

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8. Show that the points (1,2,3), (2,3,1) and (3,1,2) form an equilateral triangle.

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9. Show that the point `A(-4, 9, 6), B(-1,6,6), C(0,7,10) form a right angled isosceles triangle.

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10. Show that ABCD is a square where A,B,C,D are the points (0,4,1),(2,3,-1),(4,5,0) and (2,6,2) respectively.

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11. Find the distance between the mid point of the line segment $\overline{AB}$ and the point $(3, -1, 2)$ where A = (6,3,-4), B = (-2,-1,2).

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12. If $M(\alpha, \beta, \gamma)$ is the mid point of the line segment joining the points $A(x_1, y_1, z_1)$ and B then find B.

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13. If (x_1, y_1, z_1) and (x_2, y_2, z_2) are two vertices and (α, β, γ) is the centroid of a triangle, find the third vertex of the triangle.

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14. Find the ratio in which the XZ-plane divides the line joining A(-2,3,4) and B(1,2,3)

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15. Show that the points (5,4,2),(6,2,-1) and(8,-2,-7)` are collinear.

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16. Show that the points $A(3, 2, -4), B(5, 4, -6)$ and $C(9, 8, -10)$ are collinear and find the ratio in which B divides $\overline{AC}$.

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17. If H,G,S, I are respectively othercentre centroid , circumcentre and incentre of a triangle formed by the points (1,2,3), (2,3,1) and (3,1,2) . Then H + G + S + I =

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18. The incentre of the triangle formed by (0,0,0), (3,0,0),(0,4,0) is

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19. A,B,C are three points OX,OY,OZ respectively, at distance a,b,c from the origin 'O'. Find the coordinates of the point which is equidistant from A,B,C and 'O'.

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20. P is a variable point which moves such that 3PA =2PB. If A(-2,2,3) and B=(13,-3,13) prove that P satisfies the equation.

$$x^2 + y^2 + z^2 + 28x - 12y + 10z - 247 = 0$$

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21. Show that the point whose distance from Y-axis in thrice its distance from (1,2,-1) satisfies the equation

$$8x^2 + 9y^2 + 8z^2 - 18x - 36y + 18z + 54 = 0.$$

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22. Find the centroid of triangle ABC where A (6,-2,7), B(3,-6,10), C(6,2,1).

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23. The centroid of the tetrahedron whose vertices are

$(4, 1, -2), (-3, 3, -4), (-3, 2, 1), (4, 2, 3)$

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24. A(5,4,6), B(1,-1,3),C(4,3,2) are three points. Find the coordinates of the point in which the bisector of

$\lfloor BAC$ meets the side BC.

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25. If the origin is shifted to the point (1, 2) by a translation of the axes, find the new coordinates of the point (3,-4)

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26. Find the ratio in which the point P(5,4,-6) divides the line segment joining the points A(3,2,-4) and B(9,8,-10) . Also find the harmonic conjugate of P.

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27. A line makes angles $90^\circ, 60^\circ, 30^\circ$ with the positive direction of X,Y,Z axes respectively. Find its direction cosisnes.

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28. Find the direction cosines of the line joining the points (-4,1,7),(2,-3,2)`

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29. Find the dr's and dc'r of the line joining the points (4,-7,3),(6,-5,2).

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30. If the d.c's of a line are $(1/c, 1/c, 1c)$ then find c.

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31. Find the angle between the lines whose direction ratios are $(1, 1, 2)\left(\sqrt{3}, -\sqrt{3}, 0\right)$

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32. O is the origin , P(2,3,4), Q(1,k,1) are points such that $\overline{OP} \perp \overline{OQ}$ then find k.

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33. Show that the line joining the points A(2,3,-1) and B(3,5,-3) is perpendicular to the line joining C(1,2,3) and $D(3, 5, 7)$.

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34. For what value of x the line joining A(4,1,2), B(5,x,0) is perpendicular to the line joining C(1,2,3), D(3,5,7).

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35. If the line joining the points A(2,3, -1) and B(3, 5, -3) is perpendicular to the line joining C(1,y,3)and D(3, 5, 7), then y =

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36. A ray makes angles $\pi/3, \pi/3$ with $\overline{OX}$ and $\overline{OY}$ respectively. Find the angle made by it with $\overline{OZ}$

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37. If α, β, γ are the angles made by a line with the positive directions of the coordinate axes, then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma =$

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The Plane

1. Write the equation of the plane $3x - 2y - 4z + 3 = 0$ in the intercept form .

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2. Find the equation of the plane which makes intercepts 2,3,4 on the x,y,z-axes respectively.

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3. Find d.c's of the normal to plane $3x - 6y + 2z - 4 = 0$

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

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5. Reduce the equation $x + 2y - 3z - 6 = 0$ of the plane to the normal form.

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6. Find the intercepts of the plane $4x + 3y - 2z + 2 = 0$ on the coordinate axes.

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7. Find the equation of the plane through the point (α, β, γ) and parallel to the plane $ax + by + cz = 0$

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8. Find the equation of the plane passing through the point (1,2,-3) and parallel to the plane

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

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9. Find the equation of the plane passing through the point $(-2, 1, 3)$ and having `(3, -5, 4) as d.r's of its normal.

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10. Find the equation of the plane through (-1,6,2) are perpendicular to the join of (1,2,3) and (-2,3,4).

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11. Find the equation of the plane If the foot of the perpendicular from origin of the plane is A(1,3,-5)

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12. Find the equation of the plane If the foot of the perpendicular from origin of the plane is A(2,3,-5).

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13. Find the equation of the plane passing through the point (2,3,4) and perpendicular to the x-axis.

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14. Find the equation to the plane parallel to the ZX-plane and passing through (0,4,4).

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15. Find the angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$.

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16. Find the angle between the planes 2x - y + z = 6 and x + y + 2 z = 7 .

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17. Find the constant k so that the planes $x - 2y + kz = 0, 2x + 5y - z = 0$ are at right angles.

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18. Show that $2x + 3y + 7 = 0$ represents a plane perpendicular to xy-plane.

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19. The equation of the plane bisecting the line segment joining the points (2,0,6) and (-6,2,4) and perpendicular to it is

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20. Show that the plane through (1,1,1),(1,-1,1) and (-7,-3,-5) is parallel to the Y-axis.

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Limits Continuity

1. Evaluate the following limits.

$$Lt_{x \to 2} \frac{2x^2 - 7x - 4}{(2x - 1)(\sqrt{x} - 2)}$$

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2. Evaluate $\lim_{x \to 0} \frac{e^{7x} - 1}{x}$

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3. Evaluate $Lt_{x \to 0} \left(\frac{e^{3+x} - e^3}{x} \right)$

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4. Evaluate $Lt_{x \to 0} \frac{e^x - \sin x - 1}{x}$

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5. Compute $\mathrm{Lt}_{x \to 0} \frac{a^x - 1}{b^x - 1}, (a > 0, b > 0, b \neq 1)$

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6. Evaluate $Lt_{x \to 0} \frac{\sqrt{1+x} - 1}{x}$

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7. Evaluate $Lt_{x \to 0} \frac{e^x - 1}{\sqrt{1+x} - 1}$

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8. Evaluate $Lt_{x \to \infty} \frac{11x^3 - 3x + 4}{13x^3 - 5x^2 - 7}$

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9. Evaluate $Lt_{x \to \infty} \left(\sqrt{x^2 + x} - x \right)$

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10. Compute $\underset{x \to \infty}{\text{Lt}} \left(\sqrt{x+1} - \sqrt{x}\right)$

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11. Evaluate $\underset{x \to 0}{\text{Lt}} \frac{1 - \cos 2mx}{\sin^2 nx}$

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12. Evaluate $Lt_{x \to \pi/2} \frac{\cos x}{\left(x - \frac{\pi}{2}\right)}$

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13. Compute $\lim_{x \to a} \frac{\tan(x-a)}{x^2-a^2} (a \neq 0).$

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14. Evaluate $Lt_{x \to 1} \frac{\sin(x-1)}{x^2-1}$

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15. $\underset{x \to 0}{\text{Lt}} \frac{\cos ax - \cos bx}{x^2} =$

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16. Find $\underset{x \to 0}{\text{Lt}} \dfrac{\sin(a+bx) - \sin(a-bx)}{x}$

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17. $\underset{x \to \infty}{\text{Lt}} \dfrac{8|x| + 3x}{3|x| - 2x}.$

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18. Show that $Lt_{x \to 0+}\left(\dfrac{2|x|}{x} + x + 1\right) = 3.$

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19. Is f defined by $f(x) = \begin{cases} \frac{\sin 2x}{x} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$

continuous at 0?

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20. Is f given by $f(x) = \begin{cases} \frac{x^2 - 9}{x^2 - 2x - 3} & \text{if } 0 < x < 5 \text{ and } x \neq 3 \\ 1.5 & \text{if } x = 3 \end{cases}$,

continuous at the points 3 .

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21. Check the continity of the following function at 2

$$. f(x) = \begin{cases} \frac{1}{2}\left(x^2 - 4\right) & \text{if } 0 < x < 2 \\ 0 & \text{if } x = 2 \\ 2 - 8x^{-3} & \text{if } x > 2 \end{cases}$$

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22. Show that

$$f(x) = \begin{cases} \frac{\cos ax - \cos bx}{x^2} & \text{if } x \neq 0 \\ \frac{1}{2}\left(b^2 - a^2\right) & \text{if } x = 0 \end{cases}$$ is continuous at 0

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23. Evaluate $Lt_{x \to 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

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24. Evaluate $Lt_{x \to 3} \frac{x^3 - 3x^2}{x^2 - 5x + 6}$

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25. Compute the limit of $Lt_{x \to 3} \frac{x^2 - 8x + 15}{x^2 - 9}$

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26. $\underset{x \to 1}{\text{Lt}} \frac{(2x - 3)\left(\sqrt{x} - 1\right)}{2x^2 + x - 3} =$

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27. Evaluate $Lt_{x \to 1} \frac{(1+x)^{3/2} - 1}{x}$

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28. Evaluate $Lt_{x \to 0} \frac{\sqrt[3]{1+x} - \sqrt[3]{1-x}}{x}$

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29. Evaluate $Lt_{x \to 0} \frac{(1+x)^{1/8} - (1-x)^{1/8}}{x}$

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30. Show that $Lt_{x \to 0} \frac{e^x - 1}{x} = 1$

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31. Evaluate $Lt_{x \to 3} \frac{e^x - e^3}{x - 3}$

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32. Evaluate $Lt_{x \to 0} \frac{e^{\sin x} - 1}{x - 3}$

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33. Evaluate $Lt_{x \to 1} \frac{\log_e x}{x - 1}$

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34. Evaluate $Lt_{x \to 0} \frac{\log(1 + 5x)}{x}$

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35. Evaluate $Lt_{x \to 0} \frac{3^x - 1}{\sqrt{1 + x} - 1}$

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36. Evaluate $Lt_{x \to 3} \frac{x^2 + 3x + 2}{x^2 - 6x + 9}$

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37. Evaluate $Lt_{x \to \infty} \frac{3x^2 + 4x + 5}{2x^2 + 3x - 7}$

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38. Compute $\lim_{x \to \infty} \frac{x^2 + 5x + 2}{2x^2 - 5x + 1}$

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39. $\underset{x \to 0}{\text{Lt}} \dfrac{1 - \cos x}{x} =$

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40. Evaluate $Lt_{x \to 0} \dfrac{\sec x - 1}{x^2}$

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41. $\underset{x \to 0}{\text{Lt}} \dfrac{1 - \cos mx}{1 - \cos nx} =$

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42. Evaluate $Lt_{x \to 0} \frac{x(e^x - 1)}{1 - \cos x}$

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43. Evaluate $Lt_{x \to 0} \frac{\log(1 + x^3)}{\sin^3 x}$

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44. Evaluate $\underset{x \to 2}{\text{Lt}} \left\{ \frac{1}{x - 2} - \frac{4}{x^2 - 4} \right\}$

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45. If f is given by $f(x) = \begin{cases} k^2x - k & \text{if } x \geq 1 \\ 2 & \text{if } x < 1 \end{cases}$ is a continuous function on R, then find k .

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46. Find whether the limit of $f(x)$ exists or not at x = 3, where

$$f(x) = \begin{cases} x + 2 & \text{if } -1 < x \leq 3 \\ x^2 & \text{if } 3 < x < 5 \end{cases}$$

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47. If $f(x) = \frac{|x|}{x}$ then show that $Lt_{x \to 0}$ f(x) does not exist.

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48. Find $Lt_{x \to -\infty} \frac{5x^3 + 4}{\sqrt{2x^4 + 1}}$

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49. Find $\underset{x \to a}{\text{Lt}} \left[\frac{\sin(x - a)\tan^2(x - a)}{(x^2 - a^2)^2} \right]$

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50. Find $Lt_{x \to a}\left[\frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}}\right]$

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51. Find $Lt_{x \to a}\left(\frac{x \sin a - a \sin x}{x-a}\right)$

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52. Evaluate $Lt_{x \to 0}\frac{x \tan 2x - 2x \tan x}{(1-\cos 2x)^2}$

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53. Evaluate $Lt_{x \to \infty} \frac{x^2 - \sin x}{x^2 - 2}$

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54. Compute $Lt_{x \to 3} \frac{x^2 - 9}{x^3 - 6x^2 + 9x + 1}$

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55. Compute $Lt_{x \to 0} \frac{\sin ax}{\sin bx}, b \neq 0, a \neq b$

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56. Evaluate $Lt_{x \to 0} \frac{\log(1+5x)}{x}$

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57. Is the function f, defined by $f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$ continuous on R?

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58. Show that f(x) = sinx is continuous on R .

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59. Define a continuous function at a point.

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Differentiation

1. If $f(x) = a^x . e^{x^2}$ then find $f'(x)$

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2. Find the derivative of $y = e^{2x} \log(3x + 4)$

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3. Find the derivative of $y = \frac{ax+b}{cx+d}, [|c| + |d| \neq 0]$

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4. If $y = \log(\cosh 2x)$ then find $\frac{dy}{dx}$

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5. Find the dirivative of $\log(\sin(\log x))$.

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6. Find $\frac{d}{dx}\left(\sec\sqrt{\tan x}\right)$.

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7. If $y = \sin^{-1}\sqrt{x}$, then find $\frac{dy}{dx}$.

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8. Find the derivative of $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$

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9. Find $\frac{dy}{dx}$ if $x = a\cos^3 t, y = a\sin^3 t.$

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10. If $x = 3\cos t - 2\cos^3 t, y = 3\sin t - 2\sin^3 t$ then find $\frac{dy}{dx}$.

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11. If $y = \left(\cot^{-1} x^3\right)^2$ then find $\frac{dy}{dx}$.

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12. Find the derivative of $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$

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13. If $f(x) = e^{2x}.\log x, (x > 0)$ then find $f'(x)$.

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14. Find the derivative of sinmx. Cosnx.

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15. Find the derivative of $y = \sin^m x . \cos^n x .$

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16. Find the derivative of $y = (ax + b)^n . (cx + d)^m .$

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17. If $f(x) = xe^x \sin x$ then find $f'(x).$

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18. If $y = x^2 e^x \sin x$, then find $\frac{dy}{dx}$

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19. Find the derivative of $e^x + \sin x \cos x$.

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20. Find the derivative of $x^n n^x \log(nx), (x > 0, n \in N)$.

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21. Find the derivative of $\left(\frac{1}{x} - x\right)^3 e^x$

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22. If $y = \frac{a - x}{a + x}, (x \neq -a)$ then find $\frac{dy}{dx}$

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23. Find the derivative of $y = \frac{px^2 + qx + r}{ax + b}$

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24. Find the derivative of the function

$$\frac{\cos x}{\sin x + \cos x}$$

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25. Find the derivative of $y = \dfrac{\sin(x + a)}{\cos x}$.

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26. Find the derivative of $y = \dfrac{\sin(ax + d)}{\cos(cx + d)}$

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27. Find the derivative of $y = \dfrac{1}{ax^2 + bx + c}$

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28. If $f(x) = \sin(\log x), (x > 0)$ then find f'(x)

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29. Find the derivative of y = $\sin\left[\cos(x)^2\right]$

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30. Find the derivative of y = $\cos(\log x + e^x)$

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31. Find the derivative of $v = \cos[\log(\cot x)]$

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32. Find the derivative of 7^{x^3+3x}.

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33. Find the derivative of $20^{\log(\tan x)}$.

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34. Find the derivative of $\log\left(\frac{x^2+x+2}{x^2-x+2}\right)$ w.r.to x.

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35. Find the derivative of $\log(\sec x + \tan x)$.

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36. If $y = \log(\tan 5x)$, then find $\frac{dy}{dx}$

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37. Find the derivative of $y = \log(\log x)$

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38. Find the derivative of $y = \sqrt{2x - 3} + \sqrt{7 - 3x}$.

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39. Find the derivative of $\left(x^3+6x^2+12x-13\right)^{100}$

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40. If $y=\sin^{-1}(\cos x)$ then find $\frac{dy}{dx}$

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41. If $y=\tan^{-1}(\log x)$ then find $\frac{dy}{dx}$

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42. If $y = \tan^{-1}\left(\cos\sqrt{x}\right)$ then find $\frac{dy}{dx}$

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43. Find the derivative of $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ w.r.to x

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44. Find the derivative of $\sin^{-1}\left(3x - 4x^3\right)$ with respect of 'x' .

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45. Find the derivative of $\cos^{-1}\left(4x^3 - 3x\right)$ w.r.to x.

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46. Find the derivative of $y = x\tan^{-1}x$

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47. Find the derivative of $y = \sin x\left(\sin^{-1}x\right)^2$.

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48. Find the derivative of $\sin h^{-1}\left(\frac{3x}{4}\right)$

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49. Find the derivative of $\sin h^{-1}\left(\frac{1-x}{1+x}\right)$

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50. Find the derivative of $\tan^{-1}\sqrt{\frac{1-\cos x}{1+\cos x}}$

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51. Find the derivative of $y = e^{\sin^{-1}x}$.

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52. If $y = e^{a\sin^{-1}x}$ then prove that $\frac{dy}{dx} = \frac{ay}{\sqrt{1-x^2}}$

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53. Find the derivative of $y = \tan^{-1}\left(\tanh\frac{x}{2}\right)$.

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54. Find the derivative of $y = \cot^{-1}(\cos ec3x)$.

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55. Find the derivative of $y = \sin x.\left(\tan^{-1} x\right)^2$.

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56. Find the derivative of $\tan^{-1}\left(\frac{a-x}{1+ax}\right)$

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57. Find the derivative of $\log\left(\sin^{-1} e^{x}\right)$

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58. Find the derivative of $y = \sin\left[\tan^{-1}(e^{x})\right]$

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59. Find the derivative of $\tan^{-1}(\sec x + \tan x)$.

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60. Find the derivative of x^x.

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61. Find the derivative of $y = x^y$.

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62. If $y = (\tan x)^{\sin x}$ then find $\frac{dy}{dx}$

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63. Find the derivative of $(\log x)^{\tan x}$

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64. If $y = e^t + \cos t, x = \log t + \sin t$ then find $\frac{dy}{dx}$.

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65. Find $\frac{dy}{dx}$ if $2x^2 - 3xy + y^2 + x + 2y - 8 = 0$.

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66. Find $\frac{dy}{dx}$ if $x^3 + y^3 - 3axy = 0$

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67. Find the derivative of $x^4 + y^4 - a^2xy = 0$ w.r.to x

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68. Differentiate $f(x) = e^x$ w.r.to $g(x) = \sqrt{x}$.

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69. Differentiate $f(x) = e^{\sin x}$ w.r.to $g(x) = \sin x$.

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70. Differentiate $f(x) = \log_a x$ with respect to $g(x) = a^x$.

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71. If $f(x) = 1 + x + x^2 + \ldots\ldots\ldots\ldots + x^{100}$, then find $f'(1)$.

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72. Find the derivative of $(\sqrt{x} - 3x)\left(x + \frac{1}{x}\right)$

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73. Find the derivative of 5 sin $x + e^x$ log x .

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74. Find the derivative of $5^x + \log x + x^2 e^x$

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75. Find the derivative of $y = e^{2x} \log(3x + 4)$

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76. Find the derivative of $\frac{1 - x\sqrt{x}}{1 + x\sqrt{x}}, (x > 0)$

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77. If $f(x) = \sqrt{\frac{1 + x^2}{1 - x^2}}(|x| < 1)$, then find $f'(x)$

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78. Find the derivative of $\tan^{-1}\left(\frac{3a^2x - x^3}{a(a^2 - 3x^2)}\right)$.

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79. If f(x)=$2x^2 + 3x + 5$, then prove that $f'(0) + 3f'(-1) = 0$

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80. If the function $f(x) = \begin{cases} x & \text{if } 0 \leq x \leq 2 \\ 2 & \text{if } x \geq 2 \end{cases}$ derivable at 2? Justify.

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81. If $x = a\left[\cos t + \log \tan\left(\frac{t}{2}\right)\right], y = a \sin t$ then find $\frac{dy}{dx}$.

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82. If $y = x^x (x > 0)$, find $\frac{dy}{dx}$

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83. Find the derivative of $x = \sin h^2 y$ w.r.t x.

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84. Find the derivative of $x = e^{\sinh y}$ with respect to x.

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85. Find the derivative of $x = \tan h^2 y$, w.r.to x.

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86. Find the derivative of $x = \tan\left(e^{-y}\right)$ with respect to x.

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87. Find the derivative of $x = \log\left(1 + \sqrt{y}\right)$ w.r. to x.

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Applications Of Derivatives

1. Find Δy and dy for the function $y = x^2 + x$, when $x = 10, \Delta x = 0.1$

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2. Find the approximate value of $\sqrt{82}$

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3. Find Δy and dy for the function $y = e^x + x$ when $x = 5, \Delta x = 0.02.$

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4. Find the approximate value of $\sqrt[3]{65}$

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5. Verify Rolle's theorem for the function $y = f(x) = x^2 + 4$on [-3,3]

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6. Verify Rolle's theroem for the function $x^2 - 1$ on [-1,1]`.

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7. Let $f(x) = (x-1)(x-2)(x-3)$ then prove that there is more than one 'c' in (1,3) such that $f'(c) = 0$

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8. If $y = x^2 + 3x + 6$ then find $\triangle y$ and dy when $x = 10,\ \triangle x = 0.01.$

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9. Find (Δy) and dy if $y = 5x^2 + 6x + 6, x = 2$ and $\Delta x = 0.001$

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10. Find Δy and dy for function $y = 1/(x+2)$ when $x = 8, \Delta x = 0.02$.

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11. If y=cosx then find Δy and dy when $x = 60^\circ$ and $\Delta x = 1^\circ = 0.0174$ rad

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12. Find the approximate value of $\sqrt{25.001}$

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13. Find the approximate value of $\sqrt[3]{999}$

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14. Find the approximate value of $\sqrt[3]{7.8}$

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15. Find the approximate value of $\sqrt[4]{17}$

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16. Find the approximate value of $\sin 62^\circ$

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17. Find approximate value of $\cos(60^\circ 5')$

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18. If the increase in the side of a square is 4% then find the approximate percentage of increase in the area of the square.

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19. If the increase in the side of a square is 2% then find the approximate percentage of increase in the area of the square.

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20. The side of a square is increased from 3 cm to 3.01 cm. Find the approximate increase in the area of the square.

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21. The radius of a sphere is measured as 14 cm. Later it was found that there is an error 0.02 cm in measuring the radius. Find the approximate error in surface of the sphere.

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22. If the radius of a sphere is increased from 7 cm to 7.02 cm. then find the approximate increase in the volume of the sphere.

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23. The diameter of a sphere is measured to be 40 cm. If an error of 0.02 cm is made in it, then find approximate errors in volume and surface area of the sphere.

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24. The time t of a complete oscillation of a simple pendulum of length l is given by $t2\pi\sqrt{\frac{l}{g}}$ where g is gravitational constant. Find the approximate percentage of error in t when the percentage of error in l is 1%.

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25. Verify Rolle's theroem for the function $x^2 - 1$ on [-1,1]`.

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26. Verify Rolle's theorem for the function $y = f(x) = x^2 + 4$on [-3,3]

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27. Verify the conditions of Lagrange's mean value theorem for the function $x^2 - 1$ on [2,3]

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28. Verify Lagrange's mean value theorem for the function $f(x) = x^2$ on [2,4]

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29. Find c so that $f'(c) = \frac{f(b) - f(a)}{b - a}$ where $f(x) = e^x, a = 0, b = 1$

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30. If the equation $x^2 + 5x + K = 0$ has real and distinct roots, then....

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31. Find the slope of the tangent to the curve $y = x^3 - x + 1$ at the point whose x co-ordinate is 2.

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32. Find the slope of the tangent to the curve, $y = x^3 - 3x + 2$ at the point whose x co-ordinate is 3.

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33. Find the slopr of the tangent to the curve $y = \frac{x-1}{x-2}$ at $x \neq 2$ and $x = 10$.

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34. Find the slope of the normal to the curve $x = a\cos^3\theta, y = a\sin^3\theta$ at $\theta = \pi/4$.

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35. Find the points at which the tangent to the curve $y = x^3 - 3x^2 - 9x + 7$ is parallel to the x-axis.

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36. Find the point on the curve $y = x^3 - 11x + 5$ at which the tangent is $y = x - 11$

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37. Find the equation of the tangent and normal to the curve $y = x^3$ at (1,1)

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38. Find the equation of tangent and normal to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (0,5).

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39. Find the equations of the tangent and normal to the curve $y = x^2$ at (0,0).

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40. Find the equations of the tangent and normal to the curve $y = \frac{1}{1+x^2}$ at (0,1).

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41. Find the equation of tangent and normal to the curve $x = \cos t, y = \sin t, \quad \text{at} \quad t = \frac{\pi}{4}$

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42. Find the equations of tangent and normal to the curve xy = 10 at (2 , 5)

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43. On the curve $y = x^2$, find a point at which the tangent is parallel to the chord joining (0,0) and (1,1).

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44. Find a point on the curve $y = x^3$, when the tangent is parallel to the chord joining (1,1), (3,27).

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45. Find a point on the graph of the curve $y = (x-3)^2$, where the tangent is parallel to the chord joining (3,0) and (4,1)

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46. Find the maxima or minima of $f(x) = x^3 - 6x^2 + 9x + 15.$

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47. Find the maxima and minima of $f(x) = \frac{x}{2} + \frac{2}{x}, (x > 0)$.

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48. Define the strictly increasing function and strictly decreasing function on an interval.

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