



MATHS

BOOKS - SHARAM PUBLICATION

QUESTION PAPER 2010



1. What is the derivative of $\sec^{-1} x$ with

respect of x ?



2. What is the least value of n such that

 $rac{d^n}{dx^n}ig(1+x+x^2ig)^m=0$ where m is a non-

negative integer?

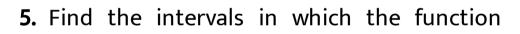
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3. Write the set of points, where the function

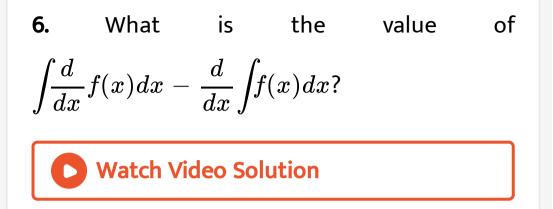
 $f(x) = x^3$ has relative (local) extreme.

4. Write in one sentence why you cannot apply Rolle's theorem to the function f(x)=|x| in the interval [-1,1]

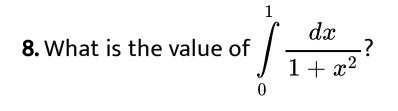




$$y = \frac{\ln x}{x}$$
 is increasing and decreasing.



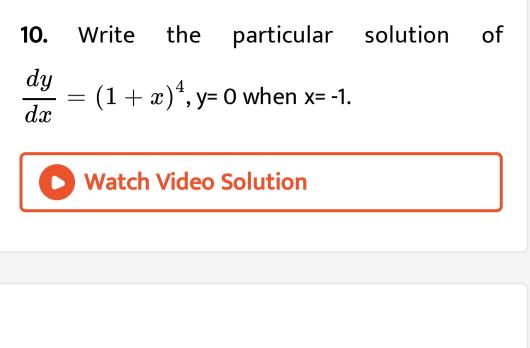
7. If
$$\int\limits_{1}^{2} f(x) dx = \lambda$$
 then what is the value of $\int\limits_{1}^{2} f(3-x) dx$?



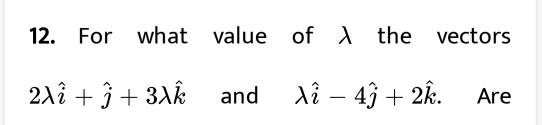


9. Write the order and the degree of the following differential equation.

$$rac{d^3y}{dx^3} = \left(rac{d^2y}{dx^2}
ight)^2 + \left(rac{dy}{dx}
ight)^4 + y$$



11. How many directions a null vector has ?



perpendicular to each other.



13. Write the equation of the plane passing through the point(1,-2,3)and perpendicular to the y-axis.

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14. Write the solution of the following LPP

Maximise Z = 2x + 3y

Subject to $x, y \ge 0, x + y \le 1$.



15. If ω is a complex cube root of 1,then for what value of. lamda the determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \lambda & 1 \\ \omega^2 & 1 & \omega \end{vmatrix} = 0?$

16. If $\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} A = \begin{bmatrix} 0 \end{bmatrix}$ then what is the order

of the matrix.

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17. If
$$P(A) = \frac{1}{2}$$
 and $P(A \cap B) = \frac{1}{3}$ then what is the probability of $(A - B)^C$?

18. If f(x)=six x and $g(x) = x^3$. Then find the vlaue of $(f(x)g(x))^m$ at $x = rac{\pi}{2}$

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19. Answer with reasons, whether the following function has a relative (local) maximum at x = 2

or not.

$$f(x) = \left\{egin{array}{ccc} x & 0 \leq x < 1 \ 1 & 1 \leq x \leq 2 \ 3 - x & 2 < x \leq 3 \end{array}
ight.$$

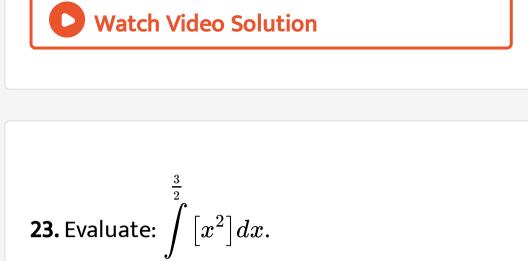
20. Interpret Lagrange's mean value theorem

geometrically.

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21. the points on the curve $y^2 = x$ where the tangents makes an angle of $\frac{\pi}{4}$ with X - axis is

22. Integrate:
$$\int \sin^4 x \cos^3 x dx$$



24. Find the area bounded by the curve $x=y^2$

and the straight lines x = 0, y = 1.

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25. Find the differential equation whose general soltution is $c_1x^2 + c_2y = 1$ where c_1, c_2 are arbitrary constants. Watch Video Solution 26. Find the particular solution of the following differential equation : $rac{dy}{dx}+rac{1+y^2}{1+x^2}=0, y(\,-1)=\,-\,\sqrt{3}$

27. Find an integrating factor of the differential equation (x + tan y) dy = tan ydx.

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28. If the position vectors of the points A, B, C are $2\hat{i} + \hat{j} - \hat{k}$, $3\hat{i} - 2\hat{j} + \hat{k}$ and $\hat{i} + 4\hat{j} - 3\hat{k}$ respectively, then prove that A, B, C are collinear.



29. Find the scalar projection of the vector

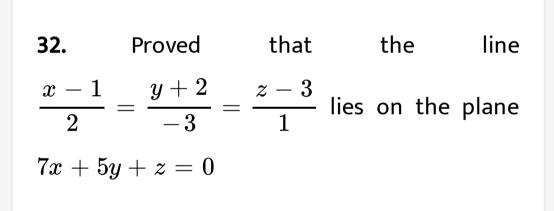
$$\vec{a} = 3\hat{i} + 6\hat{j} + 9\hat{k}$$
 on $\vec{b} = 2\hat{i} + 2\hat{j} - \hat{k}$.
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30. Find the value of λ such that the following vectors are coplanar:

 $-\hat{i}+\lambda\hat{j}-\lambda\hat{k},2\hat{i}+4\hat{j}+5\hat{k},\ -2\hat{i}+4\hat{j}-4\hat{k}$

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

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33. If one end of a diameter of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z - 11 = 0$ is (-1,2,4) then find the coordinates of the other end.

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34. Show that feasible region for the following

constarints in a graph

 $2x+y\leq 4, x\geq 0y\geq 0.$

35. If a system of equations $\lambda x + 3y = 0$

 $x+(\lambda-2)y=0$ has infinitely many

solutions, then find the values of λ .

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36. Find the inverse of the following :

 $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

37. If the sets A and B have m and n elements respectively, then how many functions can be defined from A and B? Answer with reasons.

38. If A and B are any two events and $A \subset B$, then prove that $P(A) \leq P(B)$

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39. If a die is thrown twice in succession, then find the probability that the sum of numbers obtained is 8.

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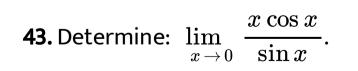
40. Find
$$rac{dy}{dx}$$
 if $x=y^x$ +tan ^{-1}x .

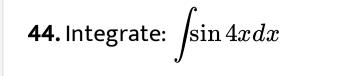
41. if
$$y = e^{\cos^{-1}x}$$
 then find $\frac{dy}{dx}$.

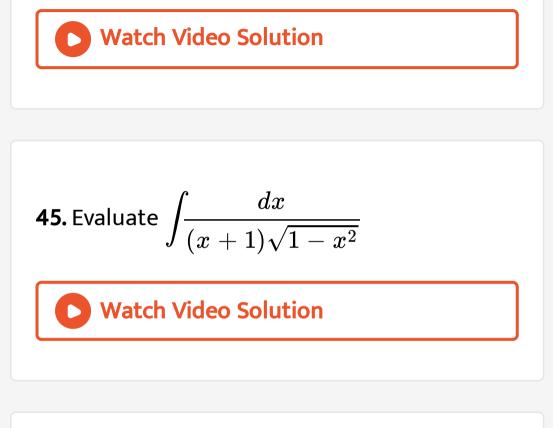


42. Show that the rectangle of maximum area that can be inscribed in a given circle is a square.









46.
$$\int_0^\pi \frac{x dx}{1+\sin x}$$

47. Find the solution of the following differential equations:

(2x+y+1)dx+(4x+2y-1)dy=0

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48. If the vertices A,B,C of a triangle ABC are at

(1,1,2),(2,2,3),(3,-1,-1) respectively, then using

vector method find the area of the triangle.

49. 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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50. Find the equation of the sphere inscribed in a tetrahedron whose faces are x = 0, y = 0

, z=0 and 2x+2y+z=1.

51. Solve the followig LPP graphically.

Maximize: z = 5x+3y

Subject to $3x+5y\leq 15$

 $5x + 2y \le 10$

 $x,y \geq 0$

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52. If a, b and c are all positive real, then prove

that minimum value of determinant



53. Solve the following system of equations by

the matrix inversion method.

$$x - y + z = 4$$

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

x + y + z = 2