MATHS

BOOKS - MAXIMUM PUBLICATION

MODEL QUESTION

Example

1. Let R be a relation on the set {1,2,3}

given by $R = \{(1, 1), (2, 2), (1, 2), (2, 1), (2, 3)\}$

.Which among the following

element to be included to R so that R

becomes Symmetric?

A. (3,3)

B. (3,2)

C. (1,3)

D. (3,1)

Answer:

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2. If * is defined by $a*b = a - b^2$ and $\oplus$ is defined by $a \oplus b = a^2 + b$, where a and b are integers. Then find the value of $(3 \oplus 4)*5$

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3. If $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$, find 2X-3Y`.

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4. Find rate of Change of area of a circle

with respect to the radius,when r=10cm

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5. Find rate of change of area of a circle with respect to the time when the radius is increasing at the rate 0.7 cm/s.Given that $r = 5cm$

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6. Integrate $\int \frac{(1+\log x)^2}{x} dx$

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7. int $\frac{f'(x)}{f(x)}dx$=..... a) $\frac{[f(x)]^2}{2}+c$ b)$\log|f(x)|+c$ c)$\log\left|\frac{f'(x)}{f(x)}\right|+c$

d)$\log|f'(x)|+c$

A. $\frac{[f(x)]^2}{2}+c$

B. $\log|f(x)|+c$

C. $\log\left|\begin{matrix}f'(x)\\f(x)\end{matrix}\right|+c$

D. $lof|f'(x)|+c$

Answer:

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8. Find the area of a circle with centre (0,0)

and radius 'a' using integration.

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9. Consider the differential equation

$$\frac{dy}{dx} = \frac{x+y}{x}$$

Write the order of the differential

equation.

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10. Consider the differential equation $\frac{dy}{dx} = \frac{x+y}{x}$

Solve the above given differential equation.

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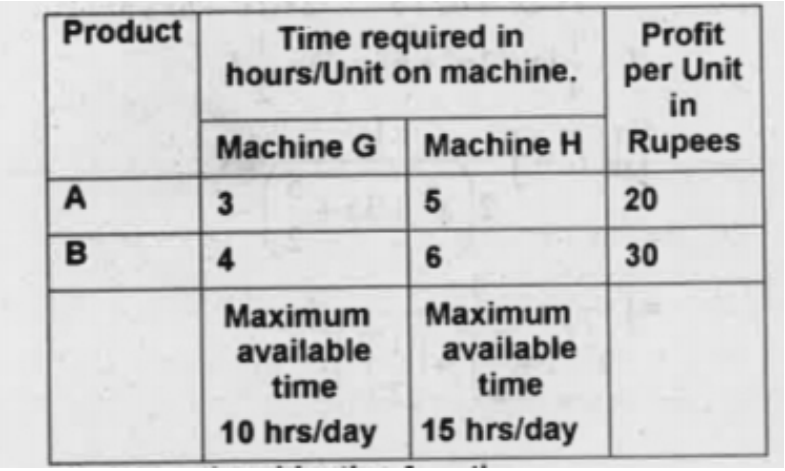
11. Following table shows a brief description about manufacturing process of a company.Time required in hours per unit of the product and maximum availability of machine is also given in the table:

Write the constraints.



Product	Time required in hours/Unit on machine.		Profit per Unit in Rupees
	Machine G	Machine H	
A	3	5	20
B	4	6	30
	Maximum available time 10 hrs/day	Maximum available time 15 hrs/day	

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12. A function $f: A \to B$,where $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$ defined by $f(1) = 5, f(2) = 6,$ $f(3) = 4$,Check whether f is a bijection.If it is a bijection,Write f^{-1} as set of ordered pair.

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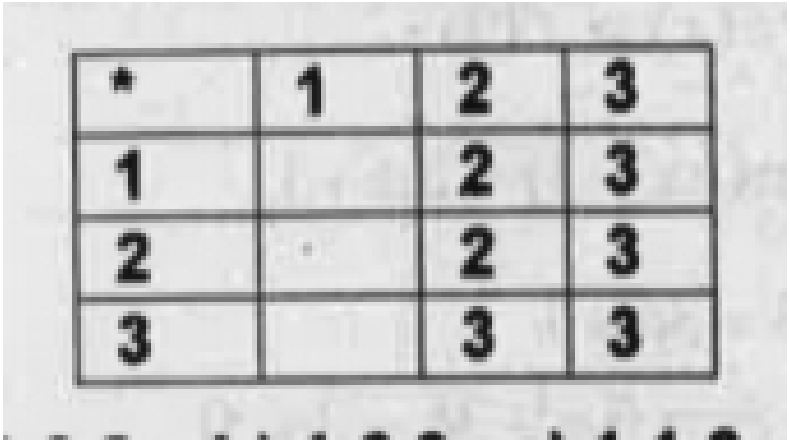
13. The operation table for an operation $*$ is given below.Given that 1 is the identity element.Then which among the following is true regarding the element in the first column?

Check whether $*$ is commutative.



*	1	2	3
1		2	3
2		2	3
3		3	3

A. 3,2,2

B. 1,2,3

C. 1,1,2

D. 2,2,2

Answer:

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14. If $\sin^{-1} x = y$,then

A. $0 \leq y \leq \pi$

B. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

C. $0 < y < \pi$

D. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

Answer:

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15. Write the principal value of $\sin^{-1}\left(\frac{1}{2}\right)$

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16. If $\sin^{-1} x = \frac{\pi}{4}$, find the value of $\cos^{-1} x$

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17. Find the relation between 'a' and 'b' if the function f defined by

$$f(x) = \begin{cases} ax + 1 & x \leq 3 \\ bx + 3 & x > 3 \end{cases}$$ is continuous.

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18. "All continuous function are not differentiable." Justify your answer with an example

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19. Find the equation to the tangent to the curve $y = x^2 - 2x + 7$ at (2,7)

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20. Integrate $\int \frac{x+2}{2x^2+6x+5} dx$

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21. Consider the differential equation

$$x\frac{dy}{dx} + y = \frac{1}{x^2}$$

Find the integrating factor.

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22. Solve the differential equation $x\frac{dy}{dx} + y = \frac{1}{x^2}$.

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23. If the vectors $\overrightarrow{PQ} = -3i + 4j + 4k$ and $\overrightarrow{PR} = -5i + 2j + 4k$ are the sides of a $\triangle PQR$ Find the angle between $\overrightarrow{PQ}$ and $\overrightarrow{PR}$

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24. If the vectors $\overrightarrow{PQ} = -3i + 4j + 4k$ and $\overrightarrow{PR} = -5i + 2j + 4k$ are the sides of a $\triangle PQR$ .Find the length of the median through the vertex P.

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25. If $\vec{a} = 5i - j - 3k$ and $\vec{b} = i + 3j + 5k$,then show that the vectors $\vec{a} + \vec{b}, \vec{a} - \vec{b}$ are perpendicular.

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26. If $\vec{a} = i - 2j + 3k, \vec{b} = 2i + 3j - 4k$ and $\vec{c} = i - 3j + 5k$,then check whether $\vec{a}, \vec{b}, \vec{c}$ are coplanar.

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27. Find the Cartesian equation of the line passing through origin and (5,-2,3)

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28. The point P(x,y,z) lies in the first octant and its distance from the origin is 12 units.If the position vector of P makes angles 45°,60° with x and y axes respectively,find coordinates of P.

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29. Solve graphically.

Maximise $Z = 5x + 3y$

Subject to the constraints

$3x + 5y \leq 15$,$5x + 2y \leq 10$,$x \geq 0$,$y \geq 0$

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30. $A = \begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$ Find A^T

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31. Express the following matrices as the sum of a Symmetric and a Skew Symmetric matrix.

$$\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$$

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32. If $A^T = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$,Verify that $A^T A = I$

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33. Without expanding prove that

$$\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix} = 0$$

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34. Consider the following system of equations

$2x - 3y + 5z = 11,$ $3x + 2y - 4z = -5,$

$x + y - 2z = -3$ Express the system in $Ax = B$ form.

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35. Consider the following system of

equations

$2x - 3y + 5z = 11, 3x + 2y - 4z = -5,$

$x + y - 2z = -3$

Solve the system by matrix method.

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36. Find $\frac{dy}{dx}$ of the following

$x^2 + xy + y = 100$

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37. Find dy/dx of the following $y^x = 2^x$

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38. Find dy/dx of the following

$x = \cos\theta, y = \sin\theta$ at $\theta = \frac{\pi}{4}$

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39. Evaluate the integrals

$$\int \frac{x}{(x+1)(x+2)} dx$$

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40. Evaluate the following $\int_0^1 xe^{x^2}dx$

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41. Evaluate the following $\int_{-5}^{5} |x+2|dx$

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42. Consider the parabolas $y^2 = 4x, x^2 = 4y$ Draw a rough figure for the above parabolas.

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43. Consider the parabolas $y^2 = 4x, x^2 = 4y$

Find the point of intersection of the

two parabolas.

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44. Consider the parabolas $y^2 = 4x, x^2 = 4y$

Find the area bounded by these two

parabolas.

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45. Find the shortest distance between the lines whose vector equations are

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

$\vec{r} = (4i + 5j + 6k) + \mu(i - 3j + 2k)$

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46. (i) If a plane meets positive x axis at a distance of 2units from the origin, positive y axis at a distance of 3 units from the origin and positive z axis at a distance of 4 units from the origin.

Find the equation of the plane.

(ii) Find the perpendicular distance of (0,0,0) from the plane obtained in part (i)

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47. A die is thrown twice let the event A be 'odd number on first throw' and B be 'odd number on the second throw' check whether A and B are independent.

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48. If $f(x) = \frac{x}{x-1}$,$x \neq 1$

Find fof(x)

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49. if $f(x) = \frac{x}{x-1}$,$x \neq 1$find the inverse of f

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50. Using elementary row operations, find the inverse of the matrix

$$\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$$

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51. f(x) is a strictly increasing function, if f'(x) is.....a)Positive b)Negative c)0 d)None of these

A. Positive

B. Negative

C. 0

D. None of these

Answer: A

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52. Show that the function F given by

$$f(x) = x^3 - 3x^2 + 4x, x \in R$$

is strictly increasing

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53. $\int_0^a f(a-x)dx$ =..... a) $\int_0^{2a} f(x)dx$ b) $\int_{-a}^{a} f(x)dx$ c) $\int_0^a f(x)dx$ d) $\int_a^0 f(x)dx$

A. $\int_0^{2a} f(x)dx$

B. $\int_{-a}^{a} f(x)dx$

C. $\int_0^a f(x)dx$

D. $\int_a^0 f(x)dx$

Answer: C

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54. Find the value of

$$\int_0^{\frac{\pi}{2}} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$$

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55. Find the area of the region bounded by the curve

$y^2 = x$

x-axis and the lines x=1 and x=4

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56. Find the general solution of the differential equation

$x\frac{dy}{dx} + 2y = x^2 \log x$

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57. A manufacturer produces nuts and bolts. It takes 1 hour of work on machine A and 3 hours on machine B to produce a package of nuts. It takes 3 hours on machine A and 1 hour on machine B to produce a package of bolts. He earns profit of Rs. 17.50 per package on nuts and Rs. 7.00 per package on bolts. Formulate the above LPP if the machine operates for at most 12 hours a day

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58. Let

$A = N \times N$ and $*$

be a binary operation on A defined by (a,b)*(c,d) = (a + c,b + d)

Find (1,2)*(2,3)

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59. Let

$A = N \times N$ and $*$

be a binary operation on A defined by (a,b)*(c,d) = (a + c,b + d)

Prove that

$*$

is commutative

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60. Let

$A = N \times N$ and $*$

be a binary operation on A defined by (a,b)*(c,d) = (a + c,b + d)

Prove that

$*$

is associative

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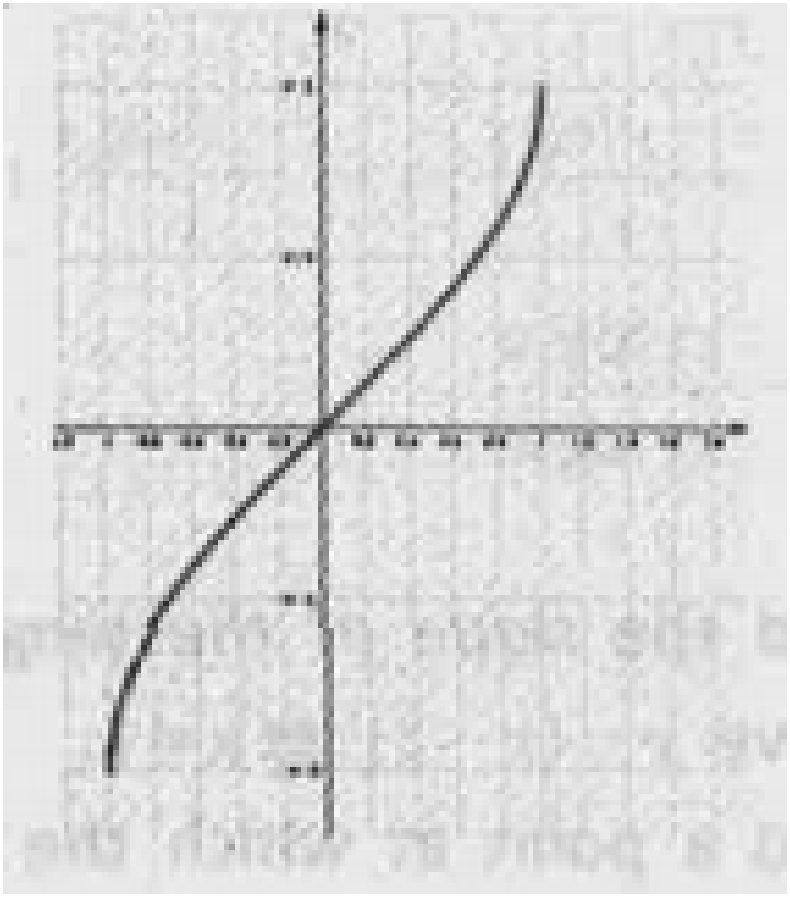
61. Identify the function from the above graph



A. $\tan^{-1} x$

B. $\sin^{-1} x$

C. $\cos^{-1} x$

D. $\cos ec^{-1} x$

Answer: B

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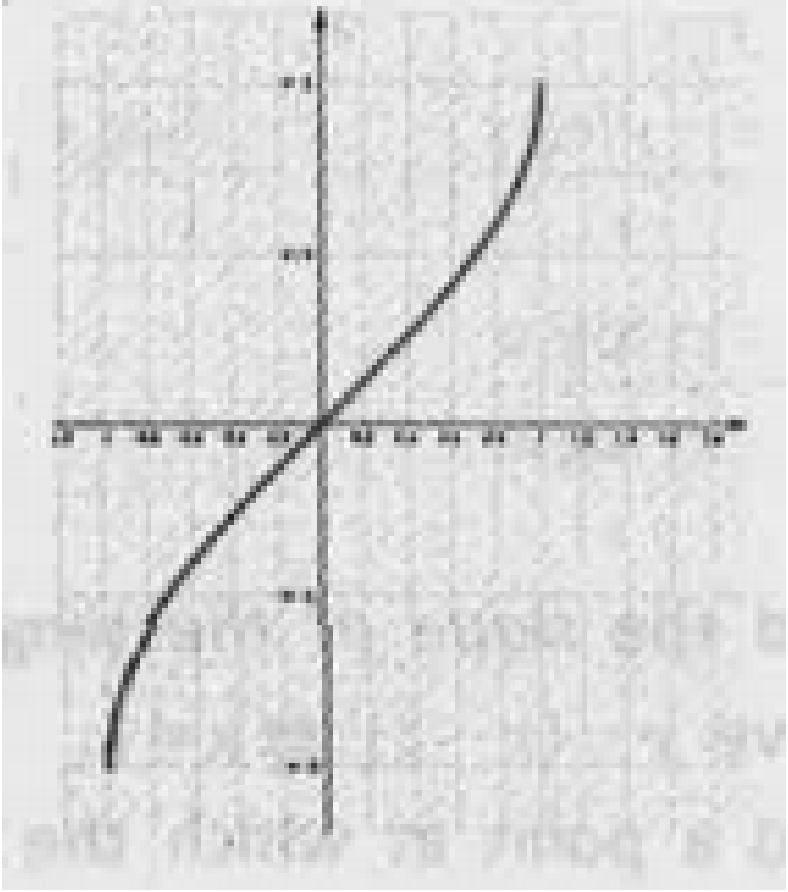
62. Find the domain and range of the function represented in above graph



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63. Prove that

$$\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{2}{11}\right)=\tan^{-1}\left(\frac{3}{4}\right)$$

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64. $\frac{d(a^x)}{dx}$ =... a) a^x b) $\log(a^x)$ c) $a^x \log a$ d) xa^{x-1}

A. a^x

B. $\log(a^x)$

C. $a^x \log a$

D. xa^{x-1}

Answer: C

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65. Find $\frac{dy}{dx}$ if $x^y = y^x$

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66. Find the slope of the tangent to the curve $y = (x-2)^2$ at x=1

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67. Find a point at which the tangent to the curve $y = (x-2)^2$ is parallel to the chord joining the point A (2,0) and B(4,4)

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68. Evaluate $\int_0^2 (x^2+1)dx$

as the limit of a sum

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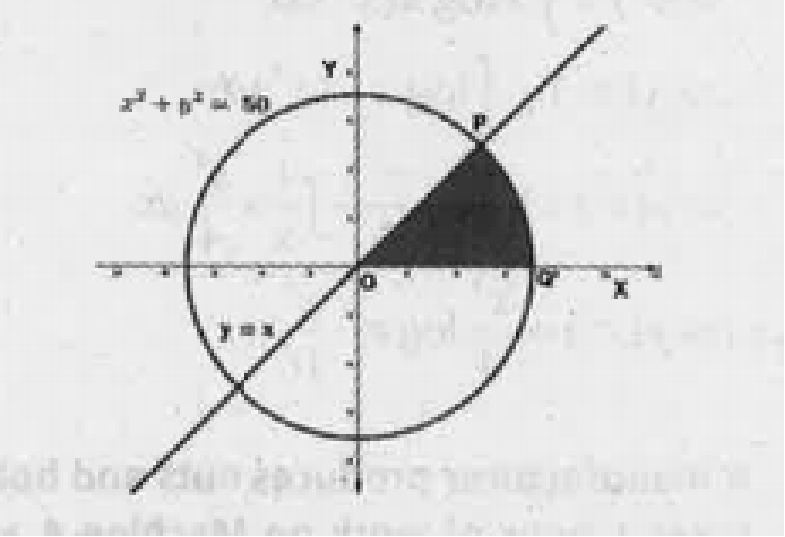
69. Consider the following figure

Find the point of intersection 'P' of the circle

$x^2+y^2=50$

and the line y = x



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70. The degree of the differential equation

$$xy\left(\frac{d^2y}{dx^2}\right)^2 + x^4\left(\frac{dy}{dx}\right)^3 - y\frac{dy}{dx} = 0 \text{ is}$$

A. 4

B. 3

C. 2

D. 1

Answer: C

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71. Find the general solution of the differential equation

$\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$

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72. Prove that for any vector

$\bar{a}, \bar{b}, \bar{c}\left[\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}\right]=2\left[\bar{a}\bar{b}\bar{c}\right]$

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73. Show that if

$\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}$

are coplanar then

$\bar{a}, \bar{b}, \bar{c}$ are also coplanar

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74. Find the equation of a plane which makes x,y,z intercepts respectively as 1,2,3

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75. Solve the following LPP Graphically,

Minimise, $Z = -3x + 4y$

Subject to constraints,

$x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$

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76. Find x and y if

$$x\begin{bmatrix}2\\3\end{bmatrix}+y\begin{bmatrix}-1\\1\end{bmatrix}=\begin{bmatrix}10\\5\end{bmatrix}$$

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77. Express the matrix

$$\begin{bmatrix}2 & -2 & -4\\-1 & 3 & 4\\1 & -2 & -3\end{bmatrix}$$

as the sum of a symmetric and a skew symmetric matrices.

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78. prove that $\begin{vmatrix} a & b & c \\ a+2x & b+2y & c+2z \\ x & y & z \end{vmatrix} = 0$

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79. if $A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ $B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$

Prove that $B = A^{-1}$

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80. if

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$$

Using

A^{-1} solve the system of linear equation given below: x-y+2z=1, 2y-3z=1, 3x-2y+4z=2

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81. Prove that the function defined by

$f(x) = \cos x^2$

is a continuous function

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82. if

$y = e^{a\cos^{-1}x}, \ -1 \leq x \leq 1$, show that

$$\frac{dy}{dx} = \frac{-ae^{a\cos^{-1}x}}{\sqrt{1-x^2}}$$

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83. Evaluate $\int \sin mx dx$

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84. Evaluate $\int \frac{1}{\sqrt{x^2+2x+2}} dx$

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85. Evaluate $\int \frac{x}{(x+1)(x+2)} dx$

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86. if $\bar{a} = 3i + 2j + 2k, \bar{b} = i + 2j - 2k$ find $\bar{a} + \bar{b}, \bar{a} - \bar{b}$

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87. if $\bar{a} = 3i + 2j + 2k$, $\bar{b} = i + 2j - 2k$ find a unit vector perpendicular to both $\bar{a} + \bar{b}$, $\bar{a} - \bar{b}$

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88. Consider the points A(1.2.7),B(2,6,3),C(3,10,-1) find $\overline{AB}$, $\overline{BC}$

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89. Consider the points A(1,2,7),B(2,6,3),C(3,10,-1) prove that A,B,C are collinear points

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90. Find the angles between the lines

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

and

$$\frac{x+2}{-1}=\frac{y-4}{8}=\frac{z-5}{4}$$

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91. find the shortest distance between the pair of lines

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

$$\bar{r}=(4i+5j+6k)+\mu(2i+3j+k)$$

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92. The probability distribution of a random variable is given by p(x) . What is $\sum P(x)$?

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93. The following is a probability distribution function of a random variable

Find K

x	-5	-4	-3	-2	-1	0
P(x)	k	2k	3k	4k	5k	7k
x	1	2	3	4	5	
P(x)	8k	9k	10k	11k	12k	

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94. Construct a 2×2 matrix whose elements are given $a_{ij} = 2i + j$

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95. Construct a 2×2 matrix whose elements are given $a_{ij} = 2i + j$.find A^2

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96. If $\int \frac{f(x)}{x^2+1}dx = \log|x^2+1| + C$, then $f(x)$=.....

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97. Find $\int xe^x dx$

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98. Form the differential equation of the family of all circles touching the y-axis at origin.

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99. Consider the relation in the set N of natural numbers defined as $R = \{(a, b) : ab$ is a factor of 6$\}$. Determine whether the relation is reflexive, symmetric or transitive.

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100. Find the area bounded by the curve $y = \cos x$ and x axis between $x = 0$ and $x = \pi$.

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101. A manufacture produces nuts and bolts. The time required to produce one packet of nuts and one packet of bolts on machines. A and B is given the following table.

He earns a profit of Rs. 25 per packet of nuts and Rs. 12 per packet of bolts. He operates his machine for atmost 15 hours a day. Formulate a linear programming problem to maximise his profit.

	Machine A	Machine B
Nuts (1 packet)	2 hours	3 hours
Bolts (1 packet	3 hours	1 hours

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102. Consider the curve $y = x^3 + 8x + 3$.Find the point on the curve at which the slope of the tangent is 20.

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103. Consider the curve $y = x^3 + 8x + 3$

Does there exist a tangent to the curve with negative slope? Justify your answer.

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104. Which of the following functions is not continues at zero?

$f(x) = \sin x.$

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105. Which of the following functions is not continues at zero?

$$f(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ 1 & x = 0 \end{cases}$$

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106. Test continuity for the following function at zero?

$$f(x) = \begin{cases} \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$$

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107. Test continuity for the folowing functions.

$$f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases} \text{ at } x = 0$$

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108. Find the values of a and b such that function defined by

`f(x)={(10,„xle3),(ax+b,„3

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109. Consider the plane $2x - 3y + z = 5$. Find the Equation of the plane passing through the point (1,1,3) and parallel to above plane.

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110. Consider the vectors $\vec{a} = 2i + j + 3k$, $\vec{b} = i + 4j - k$.Find the projection of $\vec{a}$ on $\vec{b}$.

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111. Consider the vectors If $\vec{a}$ is perpendicular to a vector $\vec{c}$ then projection of $\vec{a}$ on $\vec{c}$

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112. Consider the vectors

$\vec{a} = 2i + j + 3k, \vec{b} = i + 4j - k$

Write a vector $\vec{d}$ such that the projection of $\vec{a}$ on $\vec{b}$

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113. Find $\int (4x + 7)\sqrt{x^2 + 4x + 13}dx$

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114. Write integrating factor of the linear differential equation $\left(\frac{dy}{dx}\right) + \left(\frac{y}{x}\right) = \sin x$

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115. Slope of the tangent to a curve at any point is twice the x coordinate of the point. If the curve passes through the point (1,4), find its equation.

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116. Solve the linear programming problem graphically

Maximise $Z = 3x + 5y$

subject to the constraints

$x + 3y \leq 3$

$x + y \leq 2$

$x, y \geq 0$

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117. If $\cos^{-1}\left(\frac{12}{13}\right) = \tan^{-1} x$ then find x.

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118. Show that $\cos^{-1}\left(\frac{4}{5}\right)+\cos^{-1}\left(\frac{12}{13}\right)=\tan^{-1}\left(\frac{56}{33}\right)$

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119. Consider the binary operation $*$ on the set R of real numbers, defined by $a*b=ab/4$

Show that $*$ is commutative and associative.

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120. Let Q be the set of Rational numbers and '$*$' be the binary operation on Q defined by '$a * b = \frac{ab}{4}$' for all a,b in Q.

What is the identity element of '$*$' on Q?

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121. Consider the binary operation $*$ on the set R of real numbers, defined by $a * b$=a$b/4$

Find the inverse of 5.

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122. Consider the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 4 & 9 \end{bmatrix}$ Find A^{-1} using elementary row operations.

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123. Consider the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 4 & 9 \end{bmatrix}$ Find the solution of the system of equations given below

$x + 2z = 2, y + 2z = 1, 4y + 9z = 3$

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124. Show that $\begin{vmatrix} 1 & a & bc \\ 1 & b & ac \\ 1 & c & ab \end{vmatrix} = (a-b)(b-c)(c-a)$

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125. If $A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ verify that $A \times adjA = |A|I$

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126. If f is a function such that $f(-x) = f(x)$, then $\int_{-a}^{a} f(x)dx$=.....

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127. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx$

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128. Evaluate $\int_0^1 \left(x^2+1\right) dx$ as the limit of a sum.

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129. Verify mean value theorem for the function $f(x) = x^2 - 4x - 3$ in the interval [1,4] .

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130. Consider the function $f(x) = \sin^{-1}\left(2x\sqrt{1-x^2}\right), \frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$

Show that $f(x) = 2\sin^{-1} x$

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131. Consider the function $f(x) = \sin^{-1}\left(2x\sqrt{1-x^2}\right), \frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$

Find f'(x)`.

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132. Show that the lines

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

are coplanar.

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133.

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

Find the equation of the plane that contains the above lines.

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134.

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

Show that the above lines intersect at the point (3,1,4).

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135. A coin is tossed 3 times. Find the probability distribution of the number of heads.

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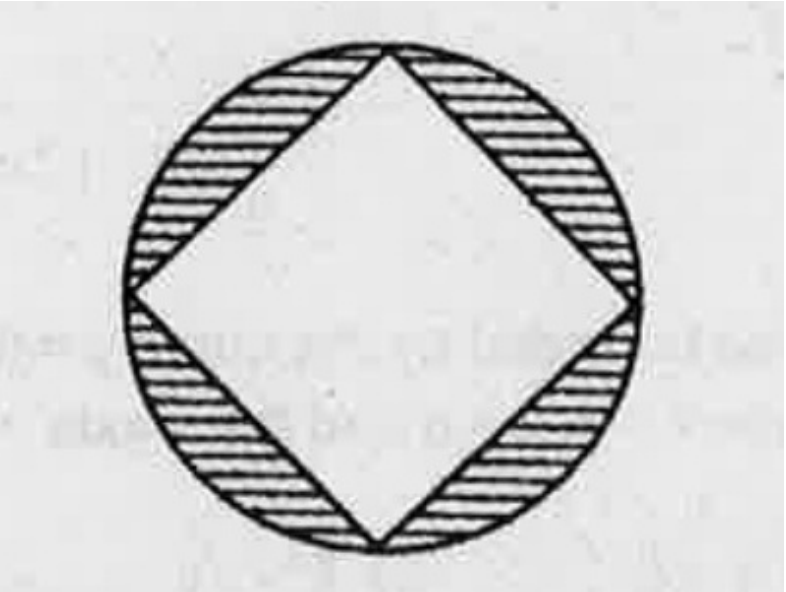
136. In a circle of radius 2 a square is inscribed as shown in the figure. Using intergration, find the area of the shaded region (Area of a square may be calculated using any convinent method).



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137. If $f(x) = \sin x, g(x) = x^2, x \in R$, then find $(fog)(x)$

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138. Let u and v be two functions defined on R as $u(x) = 2x - 3$ and $v(x) = \frac{3 + x}{2}$ .Prove that u and v are inverse to each other.

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139. For the symmetric matrix $A = \begin{bmatrix} 2 & x & 4 \\ 5 & 3 & 8 \\ 4 & y & 9 \end{bmatrix}$ .Find the value of x and y .

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140. From the symmetric matrix $A = \begin{bmatrix} 2 & x & 4 \\ 5 & 3 & 8 \\ 4 & y & 9 \end{bmatrix}$, verify AA' and A+A' are symmetric matrices.

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141. Find the slope of tangent line to the curve $y = x^2 - 2x + 1$

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142. Find the equation of the tangent to the curve $y = x^2 - 2x + 1$ which is parallel to the line $2x - y + 9 = 0$.

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143. If $\int f(x)dx = \log|\tan x| + C$. Find $f(x)$

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144. Evaluate $\int \frac{1}{\sqrt{1-4x^2}} dx$

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145. The area bounded by the curve y=f(x), x-axis and the line x=a and x=b is ?

A. $\int_a^b x dy$

B. $\int_a^b x^2 dy$

C. $\int_a^b y dx$

D. $\int_a^b y^2 dx$

Answer:

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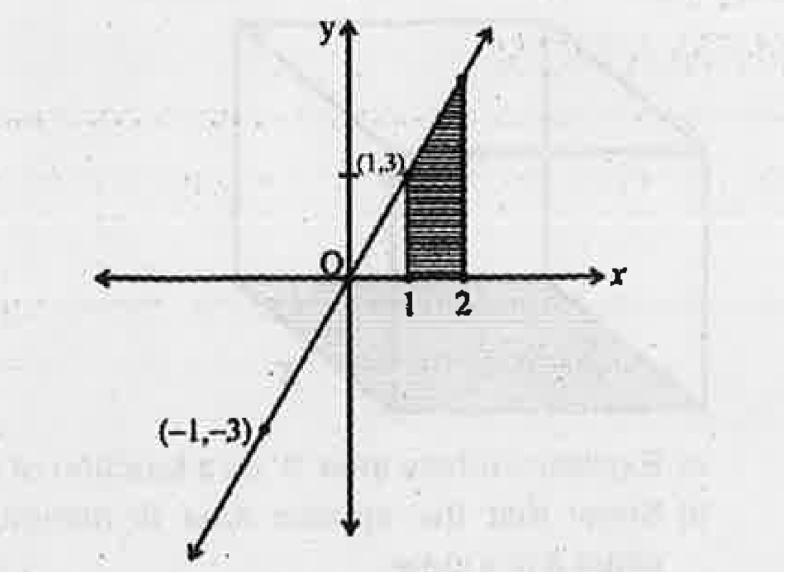
146. Find area of the shaded region using integration.



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147. The order of the differential equation formed by $y = A\sin x + B\cos x$, where A and B are arbitary constants is ... a)1 b)2 c)0 d)3

A. 1

B. 2

C. 0

D. 3

Answer:

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148. Solve the differential equation $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$

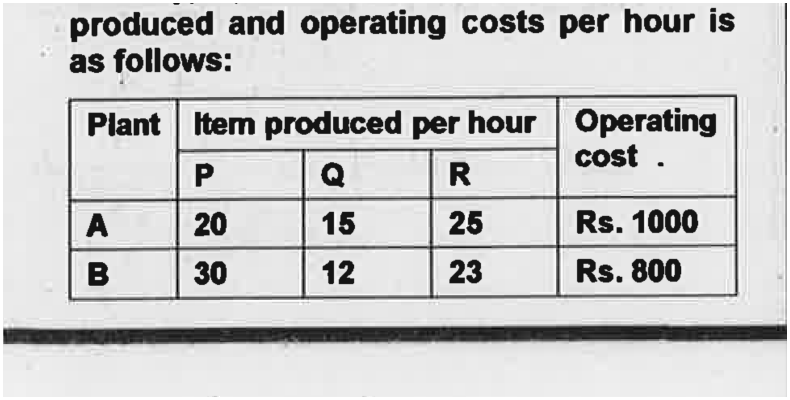
Watch Video Solution

149. A factory produces three items P,Q and R at two plants A and B . The number of items produced and operating costs per hour is as follows:

It is desired to produce at least 500 items of type P , at least 400 items of type Q and 300 items of type R per day.

Is it a maximisation case or a minimisation case?

Why?



produced and operating costs per hour is as follows:

Plant	Item produced per hour			Operating cost .
	P	Q	R	
A	20	15	25	Rs. 1000
B	30	12	23	Rs. 800

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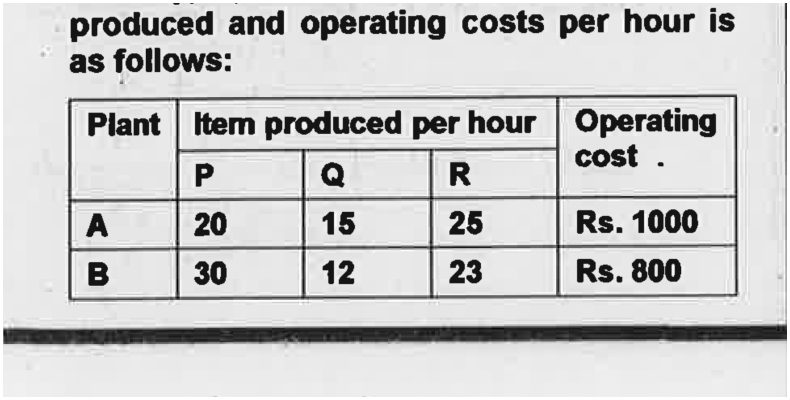
150. A factory produces three items P,Q and R at two plants A and B . The number of items produced and operating costs per hour is as follows:

It is desired to produce at least 500 items of type P , at least 400 items of type Q and 300 items of type R per day.

Write the objective function and constraints.



produced and operating costs per hour is as follows:

Plant	Item produced per hour			Operating cost .
	P	Q	R	
A	20	15	25	Rs. 1000
B	30	12	23	Rs. 800

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151. The function P is defined as "to each person on the earth is assigned a date of birth." is this a function one-one? Give reason.

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152. Consider the function $f: \left[0, \frac{\pi}{2}\right] \to R$ given by $f(x) = \sin x$ and $g: \left[0, \frac{\pi}{2}\right] \to R$ given by $g(x) = \cos x$.

Show that f and g are one-one functions.

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153. Consider the function $f: \left[0, \frac{\pi}{2}\right] \to R$ given by $f(x) = \sin x$ and $g: \left[0, \frac{\pi}{2}\right] \to R$ given by $g(x) = \cos x$.

Is $f + g$ one-one?Why?

Watch Video Solution

154. The number of one-one function from a set containing 2 elements to a set containing 3 element is.....a)2 b)3 c)6 d)8

A. 2

B. 3

C. 6

D. 8

Answer:

Watch Video Solution

155. If $A = \sin^{-1}\frac{2x}{1+x^2}$, $B = \cos^{-1}\frac{1-x^2}{1+x^2}$, $C = \tan^{-1}\frac{2x}{1-x^2}$ satisfies the condition $3A - 4B + 2C = \frac{\pi}{3}$. Find the value of x.

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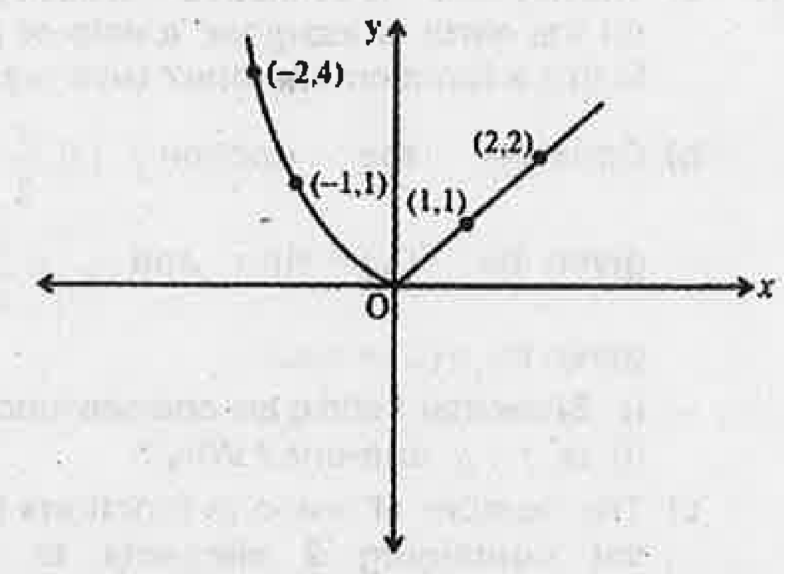
156. Write the function whose graph is shown below.



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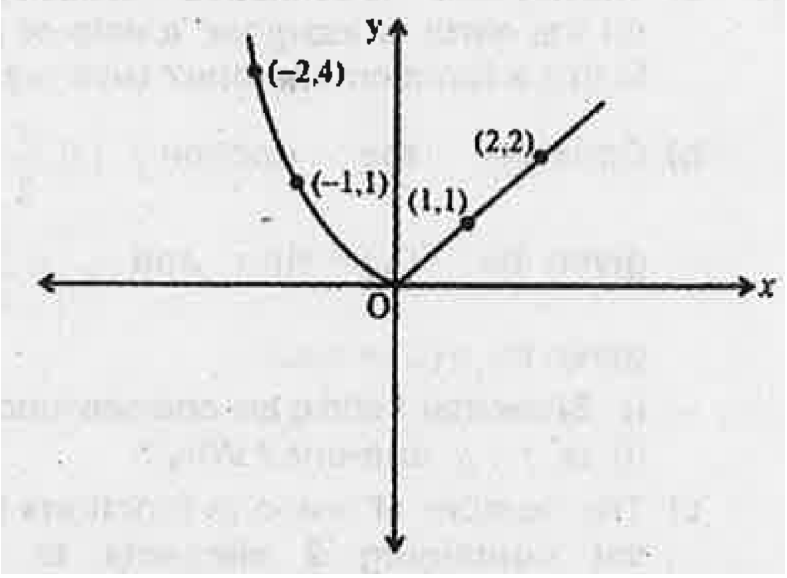
157. Write the function whose graph is shown below.

Discuss the continuity of the function .



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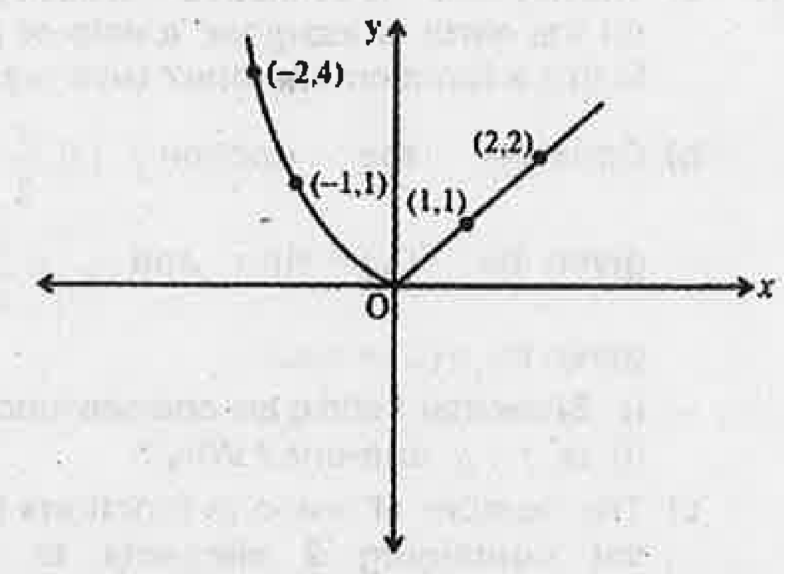
158. Write the function whose graph is shown below.

Discuss the differentiability of the function .



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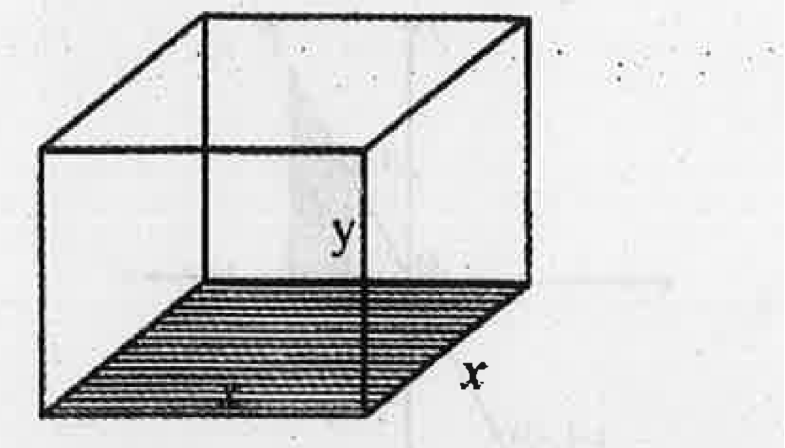
159. A cuboid with a square base and given volume v is shown in figure:

Express surface area 'S' as a function of x.



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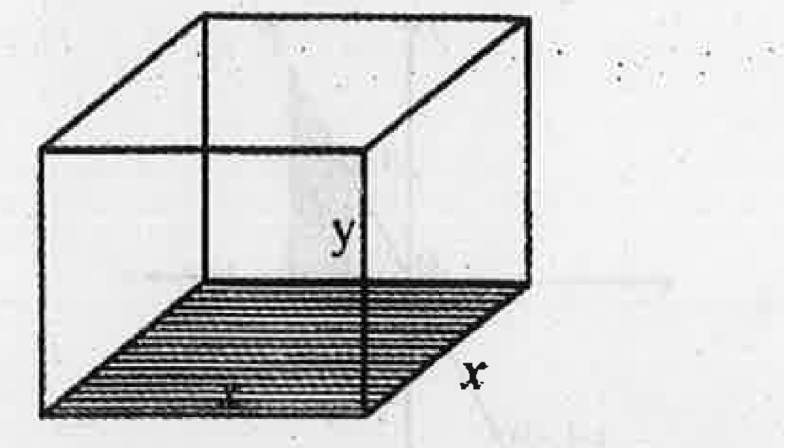
160. A cuboid with a square base and given volume V is shown in figure:

Show that the surface area is minimum when it is a

cube .



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161. If $2x + 4 = A(2x + 3) + B$, find A and B

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162. If $2x + 4 = A(2x + 3) + B$, find A and B

and evalute $\int \frac{2x + 4}{x^2 + 3x + 1} dx$

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163. Consider the Differential equation

$\cos^2 x \frac{dy}{dx} + y = \tan x$. Find

its degree

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164. Consider the Differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x$. Find the integrating factor

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165. Consider the Differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x$. Find the general solution.

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166. The position vectors of three points A,B,C are given to be $i + 3j + 3k$, $4i + 4k$, $-2i + 4j + 2k$

respectively.Find $\overrightarrow{AB}$ and $\overrightarrow{AC}$

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167. The position vectors of three points A,B,C are given to be $i+3j+3k$, $4i+4k$, $-2i+4j+2k$ respectively.Find the angle between $\overrightarrow{AB}$ and $\overrightarrow{AC}$

Watch Video Solution

168. The position vectors of three points A,B,C are given to be $i+3j+3k$, $4i+4k$, $(-2i+4j+2k$ respectively

Find a vector which is perpendicular to both $\overrightarrow{AB}$ and $\overrightarrow{AC}$ having magnitude 9 units.

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169. If $\bar{a}, \bar{b}, \bar{c}$ are coplaner vectors , write the vector perpendicular to $\bar{a}$

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170. If $\bar{a}, \bar{b}, \bar{c}$ are coplaner, prove that $\left[\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}\right]$ are coplanar.

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171. Write all the direction cosines of x-axis.

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172. If a line makes α, β, γ with x,y,z axis respectively, then prove that $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$

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

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174. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$. Show that $A^2 - 5A + 7I = 0$

Hence find A^4 and A^{-1}.

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175. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$

Find A^{-1}

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176. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$

Using it solve the system of equations

$2x - 3y + 5z = 16$

$3x + 2y - 4z = -4$

$x + y - 2z = -3$

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177. Find $\frac{dy}{dx}$ of the following

$\sin^2 x + \cos^2 y = 1$

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178. Find $\frac{dy}{dx}$ of

$y = x^x$

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179. Find $\frac{dy}{dx}$, If $x = a(t - \sin t)$, $y = a(1 + \cos t)$

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180. $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$

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181. Evaluate the following:

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^7 x dx$$

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182. Evaluate the following:

$$\int x \sin 3x dx$$

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183. Find the area bounded by the curve y= sin x with x-axis, between x=0 and $x = 2\pi$

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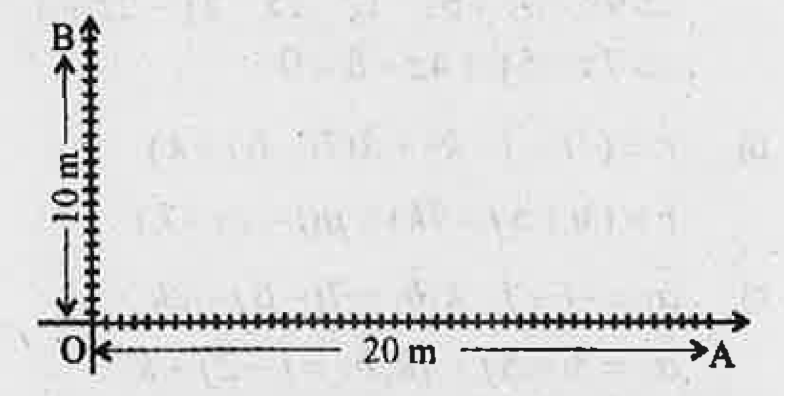
184. Two fences are made in a grass field as shown in the figure . A cow is tied at the point O with a rope of length 3m.

If there is no fences find the maximum area of grass that cow can graze.



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

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186. The Cartesian equation of two lines are given by

$$\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}, \frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$$

Write the vector equation of these lines.

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

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188. A bag contains 4 red and 4 black balls . Another bag contains 2red and 5 black balls. One of the two bags is selected at random and a ball is drawn from the bag and which is found to be red . Find the probability that the ball is drawn from first bag.

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189. A random variable X has the following distribution function:

Find k.

X	0	1	2	3	4
P(X)	K	3k	5k	7k	4k

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190. A random variable X has the following distribution function: Find the mean and the variance of the random variable.

X	0	1	2	3	4
P(X)	K	3k	5k	7k	4k

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191. Find the equation of a plane which makes equal intercepts of 6 units with the coordinate axis.

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192. Verify Rolle's Theorem for the function

$f(x) = x^2 + 2x - 8\,, x \in [-4, 2]$

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193. Form the differential equation of the family of all circles touching the y-axis at origin.

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194. Show that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

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195. Evaluate $\int_0^2 e^x dx$ as limit of a sum.

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196. if $x = \sin^{-1}\frac{3}{5}$, then which of the following is true.

A. $x = \cos^{-1}\frac{5}{3}$

B. $x = \tan^{-1}\frac{3}{4}$

C. $x = \cos ec^{-1}\frac{5}{4}$

D. $x = \cot^{-1}\frac{3}{4}$

Answer:

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197. Evaluate $\tan\left(\sin^{-1}\frac{3}{5}+\cot^{-1}\frac{3}{2}\right)$

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198. $\sin^{-1}(\sin x)=x$ is defined on

A. $x\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

B. $x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

C. $x\in[0,\pi]$

D. $x\in(0,\pi)$

Answer:

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199. find the value of $\sin^{-1}\left(\sin\frac{13\pi}{4}\right)$.

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200. Consider the functions $f(x) = \sin x$ and $g(x) = x^3$

Find $fog(x)$

Watch Video Solution

201. Find the shortest distance between the skew lines $\vec{r} = \left(\vec{i} + 2\vec{j} + \vec{k}\right) + \lambda\left(\vec{i} - \vec{j} + \vec{k}\right)$ and

$$\vec{r} = \left(2\vec{i} - \vec{j} - \vec{k}\right) + \eta\left(2\vec{i} + \vec{j} + 2\vec{k}\right)$$

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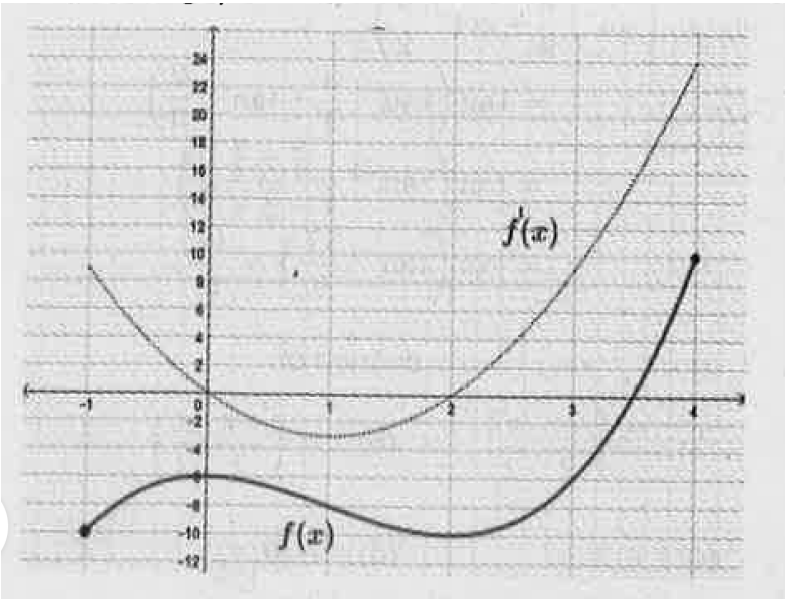
202. The figure shows the graph of a function $f(x)$ and it's derivative $f'(x)$. using these graphs answer the following questions

Identify the points at which the function $f(x)$ have

a local maximum and minimum.



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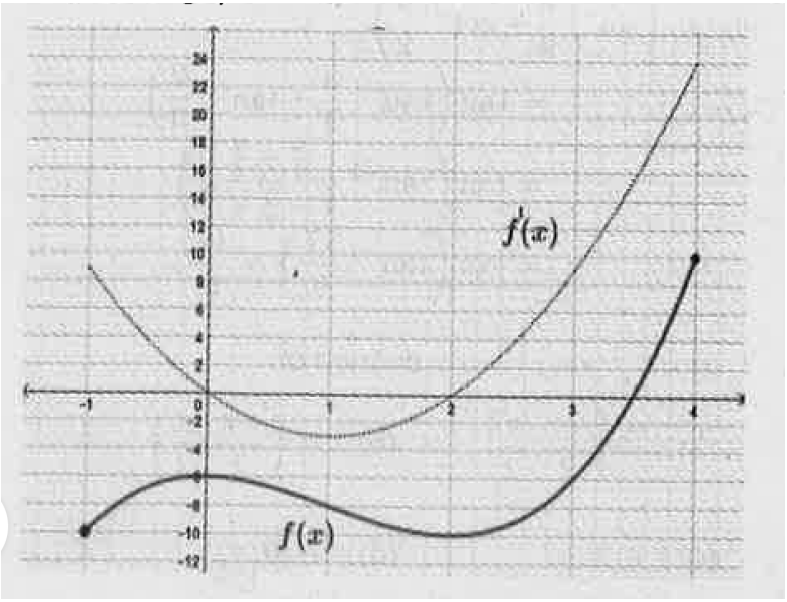
203. The figure shows the graph of a function $f(x)$ and it's derivative $f'(x)$. using these graphs answer the following questions

Find the intervals on which the function $f(x)$ is

strictly decreasing.



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204. Find $\frac{dy}{dx}$, if $y = \log(\cos(e^x))$

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205. If $y = \sin^{-1} x$, prove that $(1 - x^2)y_2 - xy_1 = 0$

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206. Evaluate $\int_0^{\frac{\pi}{2}} \cos 2x dx$

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207. Find the area bonded by the curve $y = \cos 2x, x = 0, x = \frac{\pi}{2}$ and x-axis.

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208. In a factory which manufactures bolts, machines A,B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their outputs 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is probability that it is manufactured by the machine B ?

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209. A coin is tossed 3 times. Find the probability distribution of the number of heads.

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210. X is a random variable which denotes the number of heads obtained when a coin is tossed three times.Find mean and variance of the probability distribution.

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211. Equation of a curve is in the form of a third degree polynomial. It has local maxima and local minima at $x = 1$ and $x = 3$.

Write $\frac{dy}{dx}$

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212. Equation of a curve is in the form of a third degree polynomial. It has local maxima and local minima at $x = 1$ and $x = 3$.

If the curve passes through the point $(3, 1)$, find the equation of the curve.

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213. Find the area of the region bounded by the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$

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214. Find the equation of all lines having slope 2 and being tangent to the curve $y + \frac{2}{x-3} = 0$

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215. Consider an operation $*$ defined on the set $A = \{1, 2, 4, 8\}$ by $a * b = LCM$ of a and b.

Show that $*$ is a binary operation.

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216. Consider the matrix $A = \begin{bmatrix} 4 & 3 & 2 \\ 1 & p & 0 \\ 1 & q & 2 \end{bmatrix}$ and it's adjoint, $adj(A) = \begin{bmatrix} 4 & -4 & r \\ -2 & 6 & 2 \\ -1 & s & 2 \end{bmatrix}$

Find $adj(A)$ and $|A|$

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217. Construct a 3×3 matrix A whose $(i, j)^{th}$ elements is $a_{ij} = 2i - j$

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218. Integrate the following $\frac{3x-1}{(x-1)(x-2)(x-3)}$

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219. Integrate the following $e^x \sin x$

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220. Let $\vec{a} = \vec{i} + \vec{j} + \vec{k}$, $\vec{b} = 2\vec{i} + m\vec{j} + 3\vec{k}$

if $\vec{a}$ is perpendicular to $\vec{b}$, find m.

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221. Let $\vec{a} = \vec{i} + \vec{j} + \vec{k}$, $\vec{b} = 2\vec{i} + m\vec{j} + 3\vec{k}$

Find a vector $\vec{c}$ perpendicular to both $\vec{a}$ and $\vec{b}$.

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222. Consider the line

$$\vec{r} = \left(-3\vec{i} + 5\vec{j} - 6\vec{k}\right) + \lambda\left(2\vec{i} + \vec{j} + 2\vec{k}\right)$$

(i)Write a point on the line.

(ii)Find the equation of a plane passing through the point obtained in part (i) and perpendicular to the given line.

(iii)Find a point on the line which is 3 units way from the point obtained in part (i).

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223. A manufacture company makes two models A and B of a product. Each piece of model A requires 9 labour hours for fabricating and 1 labour hour for finishing and B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing the maximum labour hours available are 180 and 30 respectively per week. The company makes a profit of Rs. 8000/- on each piece of Model A and Rs. 12000/- on each piece of Model

B. How many piece of Model A and B should be manufactured per week to realise a maximum profit? What is the maximum profit per week?

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224. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 1 & 0 \\ 1 & 3 & -2 \end{bmatrix}$

Which of the following is the order of the matrix $A + B$?

A. 2xx2

B. 3xx2

C. 2xx3

D. 3xx3

Answer:

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225. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$ $Find$ 3A`

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226. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 1 & 0 \\ 1 & 3 & -2 \end{bmatrix}$

Evaluate $3A - B$

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227. If $y = \sin^{-1} x$,Find $\frac{dy}{dx}$

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228. If $y = \sin^{-1} x$,then show that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$

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229. Which of the following is the solution of the differential equation $\frac{dy}{dx} + \sin x = 0$ a)

$y = C\cos x$ b)$y = \cos x + C$ c)$y = \sin x + C$

d)$y = C\sin x$

A. $y = C\cos x$

B. $y = \cos x + C$

C. $y = \sin x + C$

D. $y = C\sin x$

Answer:

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230. From the differential equation representing the family of curves $y = a\sin(x + b)$,where a and b are arbitrary constants.

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231. Using properties of determinants prove the following.

$$\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$$

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232. Write a function which is not continuous at $x = 0$ and justify your answer

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233. Check the continuity of the function

$$f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ -x + 2 & \text{if } x > 0 \end{cases}$$

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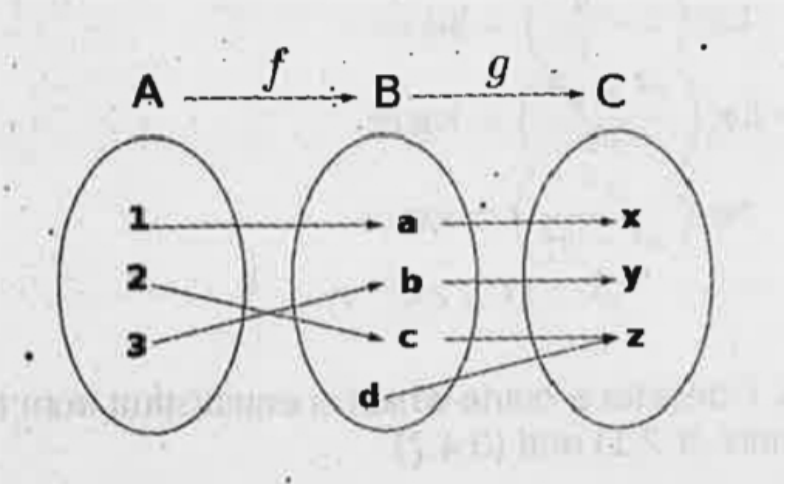
234. Consider the arrow diagram of the functions f and g.

Write the function gof.



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235. If α, β, γ are the direction angles of a vector, then which the following can be $\alpha + \beta$?

80°

60°

120°

can't be determined

A. 80°

B. 60°

C. 120°

D. can't be determined

Answer:

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236. Find the direction cosines of the line passing through the points (2,8,3) and (4,5,9).

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237. If $\tan^{-1} x = \frac{\pi}{10}$,then the value of $\cot^{-1} x$ is

A. $\frac{\pi}{5}$

B. $2\pi/5$`

C. $3\pi/5$`

D. $4\pi/5$

Answer:

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238. Find the value of $\sin\left(2\tan^{-1}\frac{2}{3}\right)+\cos\left(\tan^{-1}\sqrt{3}\right)$

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239. Let $A=\{-1,0,1\}$

Give reason why the operation defined by

$a*b=\frac{a}{b}$ is not a binary operation on A.

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240. Let $A = \{-1, 0, 1\}$

Write a binary operation $*$ on A.

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241. Let $A = \{-1, 0, 1\}$

How many binary operations are possible on A?

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242. Find the equation of a line L passing through the points (-1,0,2) and (2,1,3).

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243. Find $\frac{dy}{dx}$ of the following: $y = \sec(\tan x)$

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244. Find $\frac{dy}{dx}$ of

$y^x = x^y$

Watch Video Solution

245. Find $\int \tan^{-1} x dx$

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246. Find the area bounded by the curve

$y = \tan^{-1} x$ with X-axis from $x = 0$ and $x = 1$

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247. Consider the DE $\left(x^2 + y^2\right) dx = 2xydy$

Solve the DE completely

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248. Consider a plane which is rquidistant from the points (1,2,1) and (3,4,7).

Which of the following is a point on the plane?

A. (1,3,1)

B. (4,2,3)

C. (2,3,4)

D. (1,3,6)

Answer:

 Watch Video Solution

249. Consider a plane which is equidistant from the points (1,2,1) and (3,4,7).

Find the equation of the above plane.

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250. Let $\vec{a} = 2\hat{i} + \hat{j} - 3\hat{k}$ and $\vec{b} = 4\hat{i} + \hat{j} + \hat{k}$ be two vectors. Find a vector $\vec{c}$ perpendicular to $\vec{a}$ and $\vec{b}$.

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251. Find the following integrals.

$$\int_0^{\frac{\pi}{2}} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$$

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252. Hence evaluate the area bounded by the curve $y = x \sin x$ between $x = -\pi$ and $x = \pi$.

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253. In a ladies hostel,60% of the students read Hindi newspaper,40% read English newspaper and

20%read both Hindi and English newspapers.A student is selected at random.

Find the probability that she reads neither Hindi nor English newspapers.

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254. In a ladies hostel,60% of the students read Hindi newspaper,40% read English newspaper and 20%read both Hindi and English newspapers.A student is selected at random.

If she reads Hindi newspaper,find the probability that she reads English newspaper.

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255. In a ladies hostel,60% of the students read Hindi newspaper,40% read English newspaper and 20%read both Hindi and English newspapers.A student is selected at random.

If she reads English newspaper,find the probability that she reads Hindi newspaper.

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256. Let A be a matrix of order 3×3 whose elements are given by $a_{ij} = 2i - j$

obtain the matrix A.

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257. Consider the matrix $A = \begin{bmatrix} 1 & 3 & 6 \\ -1 & -1 & 2 \\ 1 & 1 & 5 \end{bmatrix}$

Find $|A|$

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258. Consider the matrix $A = \begin{bmatrix} 1 & 3 & 6 \\ -1 & -1 & 2 \\ 1 & 1 & 5 \end{bmatrix}$

Verify that $A \times adjA = |A|I$

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259. Find the following integrals

$$\int \frac{1}{x^2 - 6x + 13} dx$$

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260. Integrate the following with respect to X:

$$\frac{\cos x}{(\sin x - 1)(\sin x - 2)}$$

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261. Let a pair of dice be thrown and the random variable X be the sum of the numbers that appear on the two dice.

Write the probability distribution of X.

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262. Let a pair of dice be thrown and the random variable X be the sum of the numbers that appear on the two dice.

Find variance of X.

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263. Consider the function $f(x) = 2x^3 - 6x^2 + 1$ .Find the equation of tangents parallel to X-axis.

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264. Consider the function $f(x) = 2x^3 - 6x^2 + 1$ Find the intervals in which the function f is decreasing.

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265. The length of a rectangle is decreasing at the rate of 5 cm/mi and the width is increasing at the rate of 4cm/min.When length is 8 cm and width is 6 cm, find the rate of change of its area.

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266. Let $\vec{a} = 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} - 8\hat{k}$ be

two vectors

Find a vector $\vec{c}$ representing a diagonal of the parallelogram with $\vec{a}$ and $\vec{b}$ as the adjacent sides.

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267. Let $\vec{a} = 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} - 8\hat{k}$

be

two vectors

Find the projection of $\vec{a}$ on $\vec{b}$.

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268. Let $\vec{a} = 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} - 8\hat{k}$

be two vectors Find the angle between the vectors $\vec{a}$ and $\vec{b}$.

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269. Maximise: $Z = 600x + 400y$

Subject to the constraints:

$x + 2y \leq 12, 2x + y \leq 12$

$4x + 5y \geq 20, x \geq 0, y \geq 0$

Draw the feasible region.

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270. Maximise: $Z = 600x + 400y$

Subject to the constraints:

$x + 2y \leq 12, 2x + y \leq 12$

$4x + 5y \geq 20, x \geq 0, y \geq 0$

Solve the LPP?

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271. Let R be a relation in the set N of natural numbers given by $R = \{(a, b) : a = b - 2\}$. Choose the correct answer.a) $(2, 3) \in R$ b) $(3, 8) \in R$ c) $(6, 8) \in R$ d) $(8, 7) \in R$

A. $(2, 3) \in R$

B. $(3, 8) \in R$

C. $(6, 8) \in R$

D. $(8, 7) \in R$

Answer:

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272. Let $*$ be a binary operation on the set Z of integers as $a * b = a + b + 1$. Then find the identity element:

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273. Write two non-zero matrices A and B for which $AB = 0$.

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274. express $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ as the sum of a symmetric matrix and a skew symmetric matrix.

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275. using properties of determinants, prove that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a).$$

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276. Which among the following is not true

A. A polynomial function is always continuous.

B. A continuous function is always differentiable.

C. A differentiable function is always continuous.

D. log x is continuous for all x greater than zero.

Answer:

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277. Find $\frac{dy}{dx}$, if $x^2 + y^2 + xy = 100$

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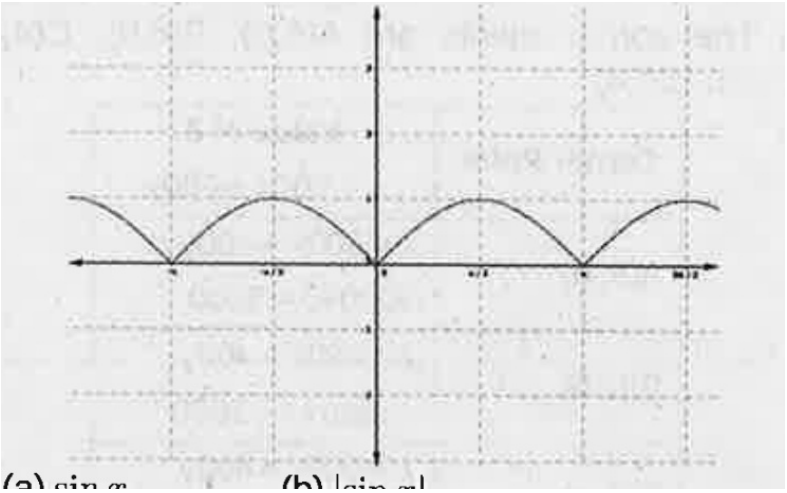
278. Identify the following function:

Is the function differentiable? Why?



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279. Find derivative of $y = \sqrt{\tan x}$

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280. The slope of the tangent to the curve $y = e^{2x}$ at (0,1) is.....a)1 b)2 c)0 d)-1

A. 1

B. 2

C. 0

D. -1

Answer:

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281. Find the equation of a line perpendicular to the tangent to the curve $y = e^{2x}$ at (0,1)) and passing through (2,3).

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282. The general solution of a differential equation contains 3 arbitrary constants. Then what is the order of the differential equation?A)2 B)3 C)0 D)1

A. 2

B. 3

C. 0

D. 1

Answer:

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283. Check whether $y = e^{-3x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 6y = 0$

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284. Let $A = R - \{3\}$ and $B = R - \{1\}$ Consider the function $f: A \to B$ defined by $f(x) = \dfrac{x-2}{x-3}$

Is f one-one and onto? Justify your answer.

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285. Let $A = R - \{3\}$ and $B = R - \{1\}$ Consider the function $f: A \to B$ defined by $f(x) = \dfrac{x-2}{x-3}$

Is f one-one and onto? Justify your answer.

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286. Let $A = R - \{3\}$ and $B = R - \{1\}$ Consider the function $f: A \to B$ defined by $f(x) = \dfrac{x-2}{x-3}$

Is f one-one and onto? Justify your answer.

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287. If $xy < 1, \tan^{-1} x + \tan^{-1} y$=..... a) $\tan^{-1}\left(\dfrac{x-y}{1+xy}\right)$ b)$\tan^{-1}\left(\dfrac{x+y}{1-xy}\right)$ c)$\dfrac{\tan x + \tan y}{1 - \tan x \tan y}$ d) $\dfrac{\tan x - \tan y}{1 - \tan x \tan y}$

A. $\tan^{-1}\left(\dfrac{x-y}{1+xy}\right)$

B. $\tan^{-1}\left(\dfrac{x+y}{1-xy}\right)$

C. $\frac{\tan x + \tan y}{1 - \tan x \tan y}$

D. $\frac{\tan x - \tan y}{1 = \tan x \tan y}$

Answer:

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288. Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$

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289. find $\frac{dy}{dx}$,if $y = x^x + x^{\sin x}$

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290. if $y = x\cos x$, find $\frac{d^2y}{dx^2}$

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291. $\int \frac{f(x)}{\tan x}dx = \log|\tan x| + c$, then $f(x)$ is

A. $\cot x$

B. $\sec^2 x$

C. $\cos ec^2 x$

D. $\cot^2 x$

Answer:

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292. if $\frac{df(x)}{dx} = 4x^2 - \frac{3}{x^4}$, given $f(2) = 0$. Find $f(x)$

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293. Area bounded by the curve $y = f(x)$,x axis and the linesx=a and $x = b$ is

A. $\int_a^b x dy$

B. $\int_a^b ydx$

C. $\int_a^b x^2 dy$

D. $\int_a^b y^2 dx$

Answer:

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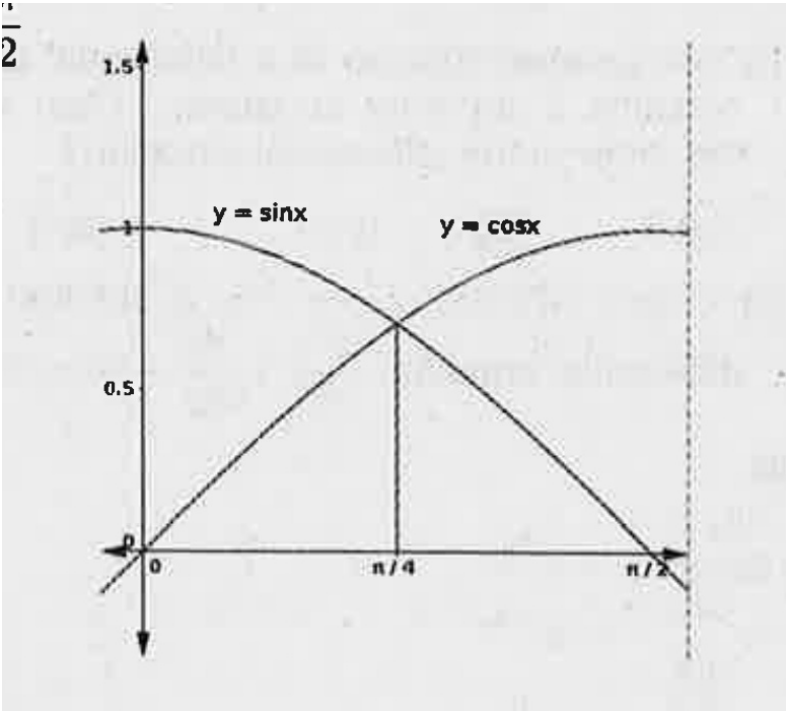
294. From the following figure, find the area of the region bounded by the curves $y = \sin x, y = \cos x$

and x axis as x varies from 0 to $\frac{\pi}{2}$



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295. Form the differential equation corresponding to the curve $y = mx$

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296. Consider the D.E $\frac{dy}{dx} + \frac{y}{x} = x^2$

Solve the D.E.

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297. Find a unit vector perpendicular to the plane ABC where A,B,C are point (1,1,2),(2,3,5) and (1,5,5).

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298. The Cartesian equation of two lines are $\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$ and $\frac{x-3}{1}=\frac{y-5}{-2}=\frac{z-7}{1}$ .Write the vector equations.

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

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300. Let two independent events A and B such that

$P(A)=0.3, P(B)=0.6$. Find

$P(A \text{ and } B)$

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301. Let two independent events A and B such that

$P(A)=0.3, P(B)=0.6$

Find $P(A \text{ and not } B)$

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302. Let two independent events A and B such that

P(A)=0.3,P(B)=0.6

Find P(A or B)

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303. Given two independent events A and B such that $P(A) = 0.3$, P(B)=0.6`. find P(neither A nor B)

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304. Let $A = [a_{ij}]_{2\times 3}$ where $a_{ij=i+j}$. construct A.

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305. Let $A = \left[a_{ij}\right]_{2\times 3}$ where $a_{ij=i+j}$. construct A.Find AA' and hence prove that AA' is symmetric.

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306. For any square matrix A,prove that `A+A' is symmetric.

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307. If A is a skew symmetric matrix of order 3. Then prove that it's determinant is zero. (without using examples).

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308. Given $\begin{vmatrix} 2+x & 3 & 4 \\ 1 & -1 & 2 \\ x & 1 & 5 \end{vmatrix}$ is a singular matrix. Find the value of x

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309. Given A and B are square matrices of order 2 such that $|A| = -1, |B| = 3$. Find $|3AB|$.

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310. Find the intervals in which the function $f(x) = x^2 + 2x - 5$ strictly increasing or decreasing.

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311. Find the equation of tangents and normals to the given curves $y = x^3$ at $(1, 1)$

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312. Find the local maxima and minima of the following functions. Also find the local maximum and minimum values.

$f(x) = \sin x + \cos x, 0 < x < \frac{\pi}{2}$

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313. Integrate the following

$$\int \frac{dx}{1+\frac{x^2}{4}}$$

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314. Integrate the following

$$\int \frac{x}{(x-1)(x-2)}dx$$

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315. Integrate the following $\int_0^{\frac{\pi}{2}} x\cos x dx$

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316. If $\vec{a}, \vec{b}, \vec{c}$ are three coplanar vectors, then $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$ is

A. 1

B. 0

C. -1

D. not defined

Answer:

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317. If $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 3$ and θ is the angle between $\vec{a}$ and $\vec{b}$. Then the maximum value of $\vec{a}.\vec{b}$ occurs whenθ=.....a)$\frac{\pi}{2}$ b)π c)0 d)$\frac{\pi}{4}$

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

B. π

C. 0

D. $\frac{\pi}{4}$

Answer:

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318. If $\vec{b} = 2\hat{i} + \hat{j} - \hat{k}, \vec{c} = \hat{i} + 3\hat{k}$ and $\vec{a}$ is a unit vector. Find the maximum value of scalar triple product $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$

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319. Solve the linear programming problem graphically:

Max: $z = 3x + 2y$

Subject to:

$x + 2y \leq 10, 3x + y \leq 15, x \geq 0, y \geq 0$

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320. The probability distribution of a random variable X is given in the following table:

Find k.

X	0	1	2	3	4
P(X)	0.1	k	2k	2k	k

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321. The probability distribution of a random variable X in given in the following table:

Find the probability that X lies between 1 and 4.

X	0	1	2	3	4
P(X)	0.1	k	2k	2k	k

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322. The probability distribution of a random variable X in given in the following table:

Find the mean of X.

X	0	1	2	3	4
P(X)	0.1	k	2k	2k	k

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