केवल मूल्यांकनकर्ता के उपयोग हेतु!

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32 पृष्ठीय

केवल परीक्षक द्वारा भरा जावे।
प्रश्न क्रमांक के सम्मुख प्राप्तांकों की प्रविष्ठी करें।

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्तांक (अंकों में)
1		
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प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्तांक (अंकों में)
16		
17		
18		
19		
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24		
25		
26		
27		
28		

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे →

प्रमाणित किया जाता है कि अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों की प्रविष्टी एवं अकों का योग सही है।

निर्धारित मुद्राः नाम, पदनाम, मोबाईल नम्बर, परीक्षक क्रमांक एवं पदांकित संस्था के नाम की मुद्रा लगाएं।

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा	परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा
Snehashish Roy V.No. - 334151	Umol

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{Solution of Ques. [1]}

[I] (d) f is neither one-one nor onto.

[II] (b) $-\frac{\pi}{6}$

[III] (c) 16

[IV] (d) $\frac{1}{36}$

[V] (a) 4

[VI] (c) $\theta = \pi$

B
S
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Solution of Ques. [2]

[I] Equivalence relation.

[II] Principal value.

[III] Symmetric matrix.

[IV] 1 [one].

[V] $-e^{-x}$

[VI] Critical point.

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{Solution of Ques.[3]}

[I] False

[II] True.

[III] True.

[IV] True

[V] False

[VI] False.

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{Solution of Ques.[4]}

Column 'A' — Column 'B'

[I] $\int \sqrt{x^2-a^2}\, dx$ $\longrightarrow$ (e) $\frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\log\left|x+\sqrt{x^2-a^2}\right| + c$

[II] $\int \sqrt{a^2-x^2}\, dx$ $\longrightarrow$ (c) $\frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + c$

[III] $\int \frac{dx}{\sqrt{x^2-a^2}}$ $\longrightarrow$ (d) $\log\left|x+\sqrt{x^2-a^2}\right| + c$

[IV] $\int \frac{dx}{\sqrt{a^2-x^2}}$ $\longrightarrow$ (b) $\sin^{-1}\frac{x}{a} + c$

[V] $\int \frac{dx}{x^2-a^2}$ $\longrightarrow$ (a) $\frac{1}{2a}\log\left|\frac{x-a}{x+a}\right| + c$

[VI] $\int \frac{dx}{a^2-x^2}$ $\longrightarrow$ (g) $\frac{1}{2a}\log\left|\frac{a+x}{a-x}\right| + c$

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[vii] Simplest form of → (f) $\sec^{-1}x$

$\cot^{-1}\left[\frac{1}{\sqrt{x^2-1}}\right], x>1$

{Solution of Ques.[5]}

[i] Zero [0].

[ii] One [1].

[iii] Value of $x = \pm\frac{1}{\sqrt{3}}$.

[iv] 1 or One.

[v] Degree = One

[vi] Integrating factor $= e^{2x}$

B S E

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(VII) Number of arbitrary constant in particular solution of a differential equation of third order is zero.

{Solution of Ques.[6]} 'OR'

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It is given that,

$$Set = A = \{1, 2, 3\}$$

$$Relation = \{(1,2), (2,1), (2,3), (3,2)\}$$

For reflexive relation :- For R to be reflexive (a,a) must exist $\forall\ a \in A$

$\because A = \{1, 2, 3\}$

$\Rightarrow 1R1 = (1,1) \notin R$

$\Rightarrow 2R2 = (2,2) \notin R$

$\Rightarrow 3R3 = (3,3) \notin R$

Since $(a,a) \notin R\ \forall\ a \in A$

$\therefore$ R is not reflexive relation.

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For Symmetric relation :- For R to be symmetric if $(a,b) \in R \Rightarrow (b,a) \in R$

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

$\Rightarrow 1R2 = (1,2) \in R$
$\Rightarrow 2R1 = (2,1) \in R$

also

$2R3 = (2,3) \in R$
$3R2 = (3,2) \in R$

$\because aRb \Rightarrow bRa$
$\therefore$ R is symmetric.

For Transitive relation :- For R to be transitive if $(a,b) \in R$ and $(b,c) \in R \Rightarrow (a,c) \in R$

$\Rightarrow 1R2 = (1,2) \in R$
$2R1 = (2,1) \in R$
$1R1 = (1,1) \notin R$

also,

$2R3 = (2,3) \in R$

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$3R2 = (3,2) \in R$

$\Rightarrow \quad 2R2 = (2,2) \notin R$

$\because \quad aRb,\ bRc \not\Rightarrow aRc$

R is not transitive.

Therefore $R = \{(1,2), (2,1), (2,3), (3,2)\}$ is symmetric but neither reflexive nor transitive.

{Solution of Ques.[7]} 'OR'

$$\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left[\frac{1-x}{1+x}\right], \quad x \in [0,1]$$

$$RHS = \frac{1}{2}\cos^{-1}\left[\frac{1-x}{1+x}\right]$$

let $x = \tan^2\theta$

$\Rightarrow \tan\theta = \sqrt{x}$

and $\theta = \tan^{-1}\sqrt{x}$ — ①

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$\Rightarrow \frac{1}{2}\cos^{-1}\left[\frac{1-x}{1+x}\right]$

Putting $x = \tan^2\theta$

$\Rightarrow \frac{1}{2}\cos^{-1}\left[\frac{1-\tan^2\theta}{1+\tan^2\theta}\right]$

$\Rightarrow \frac{1}{2}\cos^{-1}\left[\cos 2\theta\right]$ formula : $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$.

$\Rightarrow \frac{1}{2}\times 2\theta$ $\because \cos^{-1}[\cos x] = x$

$\Rightarrow \theta$

$\Rightarrow \tan^{-1}\sqrt{x}$ [from equation (1)]

$=$ LHS.

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{Solution of Ques[8]}

Given that,

$$2\begin{bmatrix} x & z \\ y & t \end{bmatrix} + 3\begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix} = 3\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 2x & 2z \\ 2y & 2t \end{bmatrix} + \begin{bmatrix} 3 & -3 \\ 0 & 6 \end{bmatrix} = \begin{bmatrix} 9 & 15 \\ 12 & 18 \end{bmatrix}$$

$$\begin{bmatrix} 2x+3 & 2z-3 \\ 2y+0 & 2t+6 \end{bmatrix} = \begin{bmatrix} 9 & 15 \\ 12 & 18 \end{bmatrix}$$

If two matrices are equal then their corresponding elements are also equal.
On comparing both sides we get

$$2x+3 = 9 \qquad 2z-3 = 15 \qquad 2y = 12$$
$$2x = 9-3 \qquad 2z = 15+3 \qquad y = \frac{12}{2}$$
$$2x = 6 \qquad 2z = 18$$
$$\boxed{x = 3} \qquad \boxed{z = 9} \qquad \boxed{y = 6}$$

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$2t+6 = 18$

$2t = 18-6$

$2t = 12$

$t = \frac{12}{2} = 6$

Hence values of $x = 3$, $y = 6$, $z = 9$ and $t = 6$

B
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{Solution of Ques.[9]}

Given that,

$2x+3y = \sin x$

To find $= \frac{dy}{dx}$

Solution :-

$2x+3y = \sin x$

differentiate wrt x

$\frac{d}{dx}[2x+3y] = \frac{d}{dx}\sin x$

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$\Rightarrow \quad \frac{d}{dx}2x + \frac{d}{dx}3y = \frac{d}{dx}\sin x$

$\Rightarrow \quad 2\frac{dx}{dx} + 3\frac{dy}{dx} = \frac{d}{dx}\sin x$

$\Rightarrow \quad 2\times 1 + 3\frac{dy}{dx} = \cos x \qquad \because \frac{dx}{dx} = 1$

$\Rightarrow \quad 2 + 3\frac{dy}{dx} = \cos x \qquad \because \frac{d}{dx}\sin x = \cos x$

$3\frac{dy}{dx} = \cos x - 2$

$$\boxed{\frac{dy}{dx} = \frac{\cos x - 2}{3}}$$

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{Solution of Ques. [10]}

Given that,

$$f(x) = 3x+17$$

Differentiating wrt x

$$f'(x) = \frac{d}{dx}(3x+17)$$

$$f'(x) = \frac{d}{dx}3x + \frac{d}{dx}17$$

$$f'(x) = 3\times1 + 0 \qquad \because \frac{dx}{dx} = 1$$

$$f'(x) = 3 \qquad \therefore \frac{dc}{dx} = 0$$

$\because$ $f'(x) > 0$ for all values of R
therefore $f(x)$ is increasing on R

Hence, $f(x) = 3x+17$ is increasing on R.

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{Solution of Ques. [11]} 'OR'

Given that,
radius of circle increasing at rate of 3cm/s
let radius of circle be r

$\therefore \quad \frac{dr}{dt} = 3$ cm/s

Given radius = 20cm.

As we know, Area of circle $= \pi r^2$
$A = \pi r^2$
differentiating wrt ~~x~~ t

$\frac{dA}{dt} = \pi \frac{d}{dt} r^2$ $\quad \because \frac{d}{dx} x^n = n x^{n-1}$

$\frac{dA}{dt} = \pi \cdot 2r \frac{dr}{dt}$ [By using chain rule]

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$

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$$\frac{dA}{dt} = 2 \times \pi \times 20 \times 3$$

$$\frac{dA}{dt} = 120\pi \, cm^2/s$$

Hence, rate of increasing of area of circle will be $120\pi \, cm^2/s$

B
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E

{Answer of Ques. [12]}

Given that,

function $= \int xe^x \, dx$

$$\int \underset{\mathrm{I}}{x} \underset{\mathrm{II}}{e^x} \, dx$$

By using integration by parts

$\Rightarrow$ I function $\times \int$ IInd function $- \int \left[\frac{d}{dx} \mathrm{I} \int \mathrm{II}\text{nd} \, dx\right]$

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$\Rightarrow x\int e^x - \int \frac{d}{dx} x \int e^x \, dx$

$\Rightarrow xe^x - \int 1 \times \int e^x \, dx$ $\quad \because \frac{d}{dx} x = 1$

$\Rightarrow xe^x - \int e^x \, dx$ $\quad \int e^x dx = e^x$

$\Rightarrow xe^x - e^x$

$\Rightarrow e^x(x-1) + c$

$\therefore \int xe^x = e^x(x-1) + c$

B
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E

{Solution of Ques. [13]}

Given that,

To prove $= \left[\vec{a}+\vec{b}\right]\cdot\left[\vec{a}+\vec{b}\right] = |\vec{a}|^2 + |\vec{b}|^2$

if $\vec{a}, \vec{b}$ are perpendicular

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$$LHS = [\vec{a}+\vec{b}]\cdot[\vec{a}+\vec{b}] = \vec{a}\cdot\vec{a} + \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{a} + \vec{b}\cdot\vec{b}$$

$$= |\vec{a}|^2 + \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{a} + |\vec{b}|^2$$

$$RHS = |\vec{a}|^2 + |\vec{b}|^2$$

equating LHS and RHS

$$|\vec{a}|^2 + \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{a} + |\vec{b}|^2 = |\vec{a}|^2 + |\vec{b}|^2$$

B

$$\vec{a}\cdot\vec{b} + \vec{a}\cdot\vec{b} = |\vec{a}|^2 + |\vec{b}|^2 - |\vec{a}|^2 - |\vec{b}|^2$$

S

E

$$\because \left[\vec{a}\cdot\vec{b} = \vec{b}\cdot\vec{a}\right]$$

$$2\vec{a}\cdot\vec{b} = 0 \quad \because \left[\vec{a}\cdot\vec{b} = |\vec{a}||\vec{b}|\cos\theta\right]$$

$$\vec{a}\cdot\vec{b} = 0/2 = 0$$

$$|\vec{a}||\vec{b}|\cos\theta = 0$$

$$\cos\theta = 0$$

$$\cos\theta = \cos 90^\circ$$

$$\theta = 90^\circ$$

$\therefore [\vec{a}+\vec{b}]\cdot[\vec{a}+\vec{b}] = |\vec{a}|^2 + |\vec{b}|^2$ if and only if

$\vec{a}, \vec{b}$ are perpendicular.

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{Solution of Ques. [14]}

Given vectors,

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

$$\vec{a}\cdot\vec{b} = (\hat{i} - 2\hat{j} + 3\hat{k})\cdot(3\hat{i} - 2\hat{j} + \hat{k})$$

$\because \vec{a}\cdot\vec{b} = a_1b_1 + a_2b_2 + a_3b_3$

$$\vec{a}\cdot\vec{b} = 3\times1 - 2\times-2 + 3\times1$$
$$= 3+4+3 = 10$$

$$|\vec{a}| = \sqrt{(1)^2 + (-2)^2 + (3)^2} = \sqrt{1+4+9} = \sqrt{14}$$

$$|\vec{b}| = \sqrt{(3)^2 + (-2)^2 + (1)^2} = \sqrt{9+4+1} = \sqrt{14}$$

$$\therefore \cos\theta = \frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$$

$$\cos\theta = \frac{10}{\sqrt{14}\sqrt{14}} = \frac{10}{14}$$

$$\cos\theta = \frac{5}{7}$$

$$\theta = \cos^{-1}\left(\frac{5}{7}\right)$$

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{Solution of Ques. [15]}

Given that,

Position vector of point $\vec{a} = 2\hat{i} - \hat{j} + 4\hat{k}$

Direction $\vec{b} = 3\hat{i} + 2\hat{j} - 2\hat{k}$

$\because$ vector equation of line passes through point $\vec{a}$ having direction $\vec{b}$ is given as

$$\vec{r} = \vec{a} + \lambda\vec{b}$$

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

{Solution of Ques. [17]} 'OR'

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

Comparing given equation by standard form

$$\frac{dy}{dx} + Py = Q$$

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we get $P = \frac{1}{x}$, $Q = x^2$

Integrating factor $= e^{\int P dx} = e^{\int \frac{1}{x} dx} = e^{\log|x|}$
$= x$

$[\therefore \int \frac{1}{x} = \log x$
$[\because e^{\log x} = x]$

$y \times$ Integrating factor $= \int Q \cdot IF\, dx$

$yx = \int x \times x^2 dx = \int x^3 dx$ $\quad [\int x^n = \frac{x^{n+1}}{n+1}]$

$xy = \frac{x^{3+1}}{3+1}$; $xy = \frac{x^4}{4} + c$

{Solution of Ques. [16]}

Equation of circle, $x^2 + y^2 = a^2$
$y^2 = a^2 - x^2$
$y = \sqrt{a^2 - x^2}$

B
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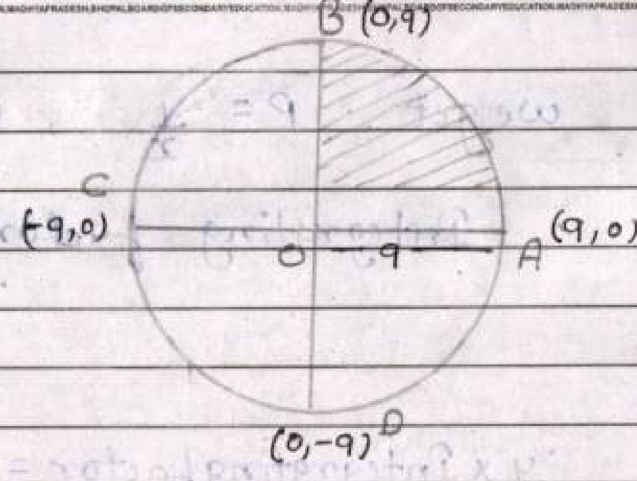

Area of circle ABCD

$= 4 \times$ Area of OABO

[Since circle is symmetric]

$$\text{Area} = 4\int_0^9 y\,dx$$

B

$$\text{Area} = 4\int_0^9 \sqrt{9^2 - x^2}\,dx$$

S

$$\text{Area} = 4\left[\frac{x}{2}\sqrt{9^2 - x^2} + \frac{9^2}{2}\sin^{-1}\frac{x}{9}\right]_0^9$$

$$\left\{\int \sqrt{9^2 - x^2} = \frac{x}{2}\sqrt{9^2 - x^2} + \frac{9^2}{2}\sin^{-1}\frac{x}{9}\right.$$

F

$$\text{Area} = 4\times\left\{\left[\frac{9}{2}\sqrt{9^2 - 9^2} + \frac{9^2}{2}\sin^{-1}\frac{9}{9}\right] - \left[\frac{0}{2}\sqrt{9^2 - 0^2} + \frac{9^2}{2}\sin^{-1}\frac{0}{9}\right]\right\}$$

$$\text{Area} = 4\times\left[0 + \frac{9^2}{2}\sin^{-1}1\right] - \left[0 + \frac{9^2}{2}\sin^{-1}0\right]$$

$$\text{Area} = 4\times\left(\frac{9^2}{2}\frac{\pi}{2} - 0\right)$$

$\because \sin^{-1}1 = \pi/2$

$\sin^{-1}0 = 0$

$$\text{Area} = 4\times\frac{9^2}{2}\times\frac{\pi}{2} = \pi 9^2 \text{ square unit.}$$

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{Solution of Ques.[18]}

Given that, Objective function $z = 4x+y$

Constraints $x+y \le 50$

$3x+y \le 90$

$x \ge 0,\ y \ge 0$

Corresponding equations of given constraints will be

$x+y=50$

$3x+y=90$

if $x=20$

$20+y=50,\ y=30$

if $x=30$

$30+y=50,\ y=20$

if $x=20$

$3\times20+y=90$

$60+y=90$

$y=30$

if $x=30$

$3\times30+y=90,\ 90+y=90$

$y=0$

$x+y=50$		
x	20	30
y	30	20
(x,y)	(20,30)	(30,20)

$3x+y=90$		
x	20	30
y	30	0
(x,y)	(20,30)	(30,0)

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$x+y \le 50$

Putting $x=0, y=0$

$0+0 \le 50$

$0 \le 50$ [True]

Feasible region is towards origin.

$3x+y \le 90$

Putting $x=0, y=0$

$0+0 \le 90$

$0 \le 90$ [True]

Feasible region is towards origin.

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From graph it is clear that feasible region is bounded hence solution occurs at corner points.

Label ST-16 A4 Points	Corresponding value of Z
(20,30)	$4 \times 20 + 30 = 110$
(30,0)	$4 \times 30 + 0 = 120$
(60,0)	$4 \times 60 + 0 = 240$ ← Maximum

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Hence maximum value of Z occurs at (60,0) and maximum value is ~~240~~. 240

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{Solution of Ques. [19]} 'OR'

Sample space (S) of cards $n(S) = 52$

Let event of getting cards of kings be E_1 and E_2 and of ace be F

$n(E_1) = 4$

Probability of getting first card of king $= \frac{n(E)}{n(S)} = \frac{4}{52}$

After replacing one card, number of king $= 3$
$n(S) = 51$

Probability of getting second card of king $= \frac{3}{51}$

$n(F) = 4 = 4$ ace.

after replacing one another card sample space become $n(S) = 50$

Probability of getting 3^{rd} card of ace $= \frac{4}{50}$

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Probability of getting 1st and 2nd card of king and 3rd of ace. by using Total probability theorem.

Total Probability $= \frac{4}{52} \times \frac{3}{51} \times \frac{4}{50}$

$= \frac{2}{5525}$

{Solution of Ques. [20]} 'OR'

$5x + 2y = 4$
$7x + 3y = 5$

Variable matrix $X = \begin{bmatrix} x \\ y \end{bmatrix}$, $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$

Constant matrix $= B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$

ST-16A4

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$$A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}, \quad C_{11} = (-1)^{1+1} M_{11} = (-1)^2 \times 3 = 3$$

$$C_{12} = (-1)^{1+2} M_{12} = (-1)^3 7 = -7$$

$$C_{21} = (-1)^{2+1} M_{21} = (-1)^3 2 = -2$$

$$C_{22} = (-1)^{2+2} M_{22} = (-1)^4 5 = 5$$

$$\text{Adj} A = \begin{bmatrix} C_{11} & C_{21} \\ C_{12} & C_{22} \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|} \text{Adj}(A) \qquad |A| = \begin{vmatrix} 5 & 2 \\ 7 & 3 \end{vmatrix} = 15 - 14 = 1$$

$$= 1 \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$$

$$X = A^{-1} B$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \end{bmatrix} \Rightarrow \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 - 10 \\ -28 + 25 \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

On comparing both matrices weget

$$x = 2$$

$$y = -3.$$

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Solution of Ques. [21] 'OR'

$$f(x) = \begin{cases} ax+1 & \text{if } x \le 3 \\ bx+3 & \text{if } x > 3 \end{cases}$$

function value $= f(3) = a \times 3 + 1 = 3a+1$

B left hand limit $\lim_{x\to 3^+} f(x) = \lim_{x \to 3^+} bx+3$

S if $x = 3+h$

$3 = 3+h$

E $h \to 0$

$\lim_{h\to 0} b(3+h)+3$

$= 3b+3$

$\lim_{x\to 3^-} f(x) = \lim_{h\to 0} a(3-h)+1$

$= 3a+1$

if $x = 3-h$

$3 = 3-h$

$h \to 0$

then if function is continuous

$\lim_{x\to 3^+} f(x) = \lim_{x\to 3^-} f(x)$

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$3 \cdot a + 1 = 3b + 3$

$3a = 3b + 3 - 1$, $3a = 3b + 2$

$a = \frac{3b}{3} + \frac{2}{3}$

$\boxed{a = b + \frac{2}{3}}$

{Solution of Ques. 22} 'OR'

$\int \underset{II}{x} \underset{I}{\tan^{-1} x}\, dx$

By using Integration by parts

$\int I \cdot II = I \int II - \int \left[\frac{d}{dx} I \int II\, dx\right] dx$

$\Rightarrow \tan^{-1}x \int x - \int \left[\frac{d}{dx} \tan^{-1}x \int x\, dx\right] dx$

$\Rightarrow \tan^{-1}x \cdot \frac{x^2}{2} - \int \frac{1}{1+x^2} \times \frac{x^2}{2}\, dx$

$\Rightarrow \frac{x^2}{2} \tan^{-1}x - \frac{1}{2} \int \frac{x^2}{1+x^2}\, dx$

$\because \int x^n dx = \frac{x^{n+1}}{n+1}$

$\frac{d}{dx} \tan^{-1}x = \frac{1}{1+x^2}$

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$$\frac{x^2}{2}\tan^{-1}x - \frac{1}{2}\int \frac{x^2+1-1}{1+x^2}\,dx$$

$$\frac{x^2}{2}\tan^{-1}x - \frac{1}{2}\int \frac{1+x^2}{1+x^2}\,dx + \frac{1}{2}\int \frac{1}{1+x^2}\,dx$$

$$\frac{x^2}{2}\tan^{-1}x - \frac{1}{2}\int 1\,dx + \frac{1}{2}\int \frac{1}{1+x^2}\,dx \qquad \int 1\,dx = x$$

$$\frac{x^2}{2}\tan^{-1}x - \frac{1}{2}\times x + \frac{1}{2}\tan^{-1}x + c \qquad \int \frac{1}{1+x^2} = \tan^{-1}x$$

$$\frac{x^2}{2}\tan^{-1}x - \frac{x}{2} + \frac{1}{2}\tan^{-1}x + C$$

$$\therefore \int x\tan^{-1}x\,dx = \frac{x^2}{2}\tan^{-1}x - \frac{x}{2} + \frac{1}{2}\tan^{-1}x + C$$

Solution of Ques. [23] 'OR'

$$\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2} \quad \text{and} \quad \frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$$

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$$-\frac{(x-1)}{3} = \frac{7(y-\cancel{2})}{2p} = \frac{z-3}{2} \quad \text{and} \quad -\frac{7(x-1)}{3p} = \frac{y-5}{1} = -\frac{(z-6)}{5}$$

$$\frac{x-1}{-3} = \frac{y-2}{\frac{2p}{7}} = \frac{z-3}{2} \quad \text{and} \quad \frac{x-1}{\frac{-3p}{7}} = \frac{y-5}{1} = \frac{z-6}{-5}$$

If two lines l_1 and l_2 are perpendicular then

$$a_1a_2 + b_1b_2 + c_1c_2 = 0$$

On comparing aboue lines by standard form: we get

$$\frac{x-x_1}{a_1} = \frac{y-y_1}{b_1} = \frac{z-z_1}{c_1}$$

$$a_1 = -3, \ b_1 = \frac{2}{7}p, \ c_1 = 2 \quad \text{and} \quad a_2 = \frac{-3}{7}p; \ b_2 = 1, \ c_2 = -5$$

$$a_1a_2 + b_1b_2 + c_1c_2 = 0$$

$$-3 \times \frac{-3}{7}p + \frac{2}{7}p \times 1 + 2 \times -5 = 0$$

$$\frac{9}{7}p + \frac{2p}{7} - 10 = 0$$

$$\frac{11p}{7} = 10, \quad p = \frac{7 \times 10}{11}, \quad \boxed{p = \frac{70}{11}}$$

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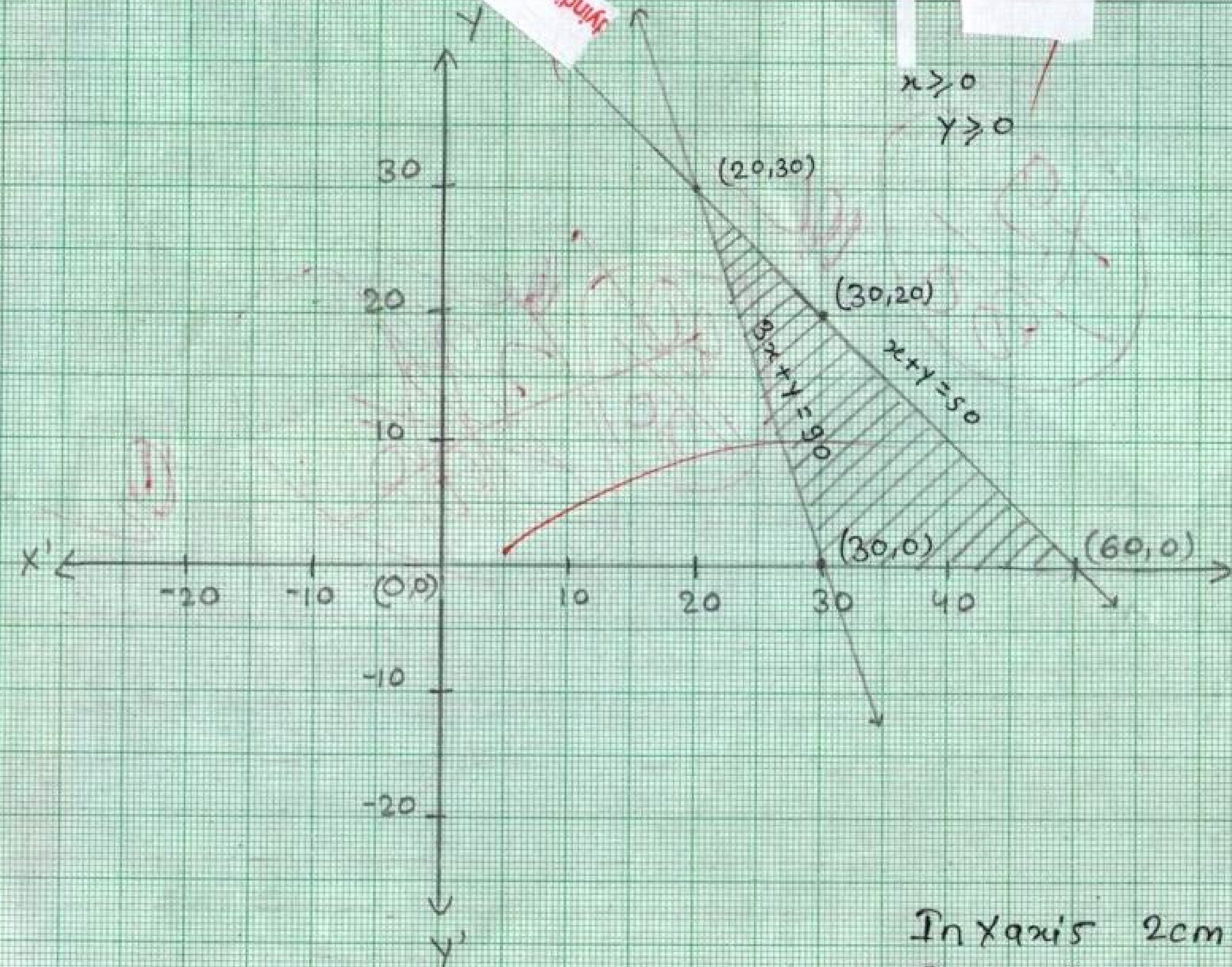

In X axis 2cm = 1 unit

In Y axis 2cm = 1 unit