KENDRIYA VIDYALAYA SANGATHAN

VARANASI REGION

1st Pre-Board Examination (2014-15)

Class – XII **Time:3.00Hrs**
Subject - Mathematics **Max Marks – 100**

General instructions –

- **(i)** All questions are compulsory.
- **(ii)** The question paper consists of 26 questions divided in to three sections viz. A, B and C. Section A comprises of 6 questions of 1 mark each, Section B comprises of 13 questions of 4 marks each and Section C comprises of 7 questions of 6 marks each.
- **(iii)** All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- **(iv)** There is no overall choice. However, internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
- **(v)** Use of calculators is not permitted.

SECTION A

1. Find the principal value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$.

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

3. Evaluate: $\int_{-\pi}^{\pi}(\sin^{-93}x + x^{295})dx$.

4. If $\vec{a}$ is a unit vector and $(\vec{x}+\vec{a}).(\vec{x}-\vec{a}) = 15$, find $|\vec{x}|$.

5. Find a unit vector perpendicular to each of the vector $\vec{a}$ and $\vec{b}$,where $\vec{a} = \hat{i}+\hat{j}+\hat{k}$ and $\hat{b} = \hat{i}+2\hat{j}+3\hat{k}$.

6. Write the vector equation of the line whose Cartesian equation is $\frac{x+3}{2} = \frac{y-1}{4} = \frac{z+1}{5}$.

SECTION: B

7. Show that $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} = 0$

8. Consider $f: R_+ \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left(\frac{(\sqrt{y+6}) - 1}{3}\right)$.

OR

Show that the relation R in the set $\mathbf{R}$ of real numbers, defined as $R = \{(a, b): a \le b^2\}$ is neither reflexive nor symmetric nor transitive.

9. Prove that: $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$.

10. Using properties of determinants, prove that: $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$.

11. Find $\frac{dy}{dx}$, if $y^x + x^y + x^x = a^b$, Where a and b are constants.

OR

If $y = (\tan^{-1} x)^2$, show that : $(x^2+1)^2 \frac{d^2y}{dx^2} + 2x(x^2+1)\frac{dy}{dx} = 2$.

12. If the function $f(x) = \begin{cases} 3ax + b, & if\ x > 1 \\ 11 & if\ x = 1 \\ 5ax - 2b & if\ x < 1 \end{cases}$ **is** continuous **at** $x = 1$, find the values of a and b.

13. Prove that the curve $y^2 = 4ax$ and $xy = c^2$ cut at right angles, if $c^4 = 32a^4$.

OR

Using differentials, find the approximate value of: $(82)^{1/4}$.

14. Evaluate the following integrals: $\int \frac{(3\sin\theta - 2)\cos\theta}{5 - \cos^2\theta - 4\sin\theta} d\theta$.

OR

Prove that: $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence, prove that $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx = \frac{\pi}{4}$.

15. Find the differential equation for the family of circles which passes through the origin and have their centres on the x-axis.

16. Solve the differential equation: $(x+y)dy + (x-y)dx = 0$.

17. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{j} - \hat{k}$ find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a}.\vec{c} = 3$.

18. Find the shortest distance between the lines given by

$\vec{r} = (-\hat{i} + 5\hat{j}) + \lambda(-\hat{i} + \hat{j} + \hat{k})$ and $\vec{r} = (-\hat{i} - 3\hat{j} + 2\hat{k}) + \mu(3\hat{i} + 2\hat{j} + \hat{k})$.

19. On a multiple choice examination with four possible answers(out of which only one is correct)for each of the six questions, what is the probability that a candidate would get five or more correct answer just by guessing?

SECTION C

20. Solve the following system of equations, using matrices,

$4x + 2y + 3z = 2$; $x + y + z = 1$; $3x + y - 2z = 5$.

OR

Obtain the inverse of the following matrix using elementary operations $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

21. A rectangular window is surmounted by an equilateral triangle. Given that the perimeter is 16 m, find the width of the window so that the maximum amount of light may enter.

OR

Show that the total surface area of a closed cuboid with square base and given volume is minimum, when it is a cube.

22. Evaluate $\int_0^3 (x^2 - 2x + 2)dx$ as limit of sum.

23. Find the area of the region bounded by $y = x^2 + 1$, $y = x$, $x = 0$ and $y = 2$.

24. Find the vector equation of the line passing through (1,2,3) and parallel to the planes:

$\vec{r}.(\hat{i} - \hat{j} + 2\hat{k}) = 5$ and $\vec{r}.(3\hat{i} + \hat{j} + \hat{k}) = 6$.

25. A furniture firm manufactures chairs and tables, each requiring the use of three machines A, B and C. Production of one chair requires 2 hours on machine A, 1 hour on machine B, and 1 hour on machine C.

Each table requires 1 hour each on machines A and B and 3 hours on machine C. The profit realized by selling one chair is Rs 30 while for table the figure is Rs 60.The total time available per week on machine A is 70 hours, on machine B is 40 hours, and on machine C is 90 hours. How many chairs and tables should be made per week so as to maximize profit? Do you agree with the message that we should avoid wood to manufacturing furniture to protect our environment?

26. For A,B and C the chances of being selected as the manager of a firm are in the ratio 4 : 1 : 2 respectively.

The respective probabilities for them to introduce a radical change in marketing strategy are 0.3 ,0.8 and 0.5.

If the changes does take place, find the probability that it is due to appointment of B or C.

MARKING SCHEME

General Instructions:

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative.

2. Alternative methods are accepted. Proportional marks are to be awarded.

3. In question(s) on differential equations, constant of integration has to be written.

4. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.

5. A full scale of marks - 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.

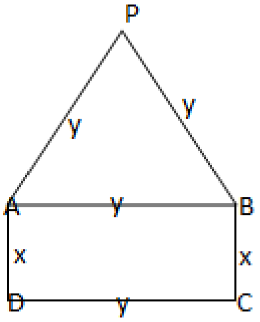
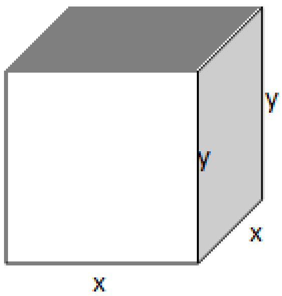
Q.No.	Answer/Solution/Steps	Marks
	SECTION A	
1-6	**1.** $\frac{2\pi}{5}$ **2.** $\tan^{-1}(\sin x)+C$ **3.** 0 **4.** 4 **5.** $\hat{i}-2\hat{j}+\hat{k}$ **6.** $\vec{r}=\left(-3\hat{i}+\hat{j}-\hat{k}\right)+\lambda\left(2\hat{i}+4\hat{j}+5\hat{k}\right)$	$1\times 6=6$
	SECTION B	
7.	$\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} =$ $\begin{vmatrix} -1 & -1 & a-b \\ -1 & -1 & b-c \\ x+3 & x+4 & x+c \end{vmatrix}$ By $R_1 \to R_1 - R_2$ and $R_2 \to R_2 - R_3$ Since a ,b, c are in AP $\therefore$ a-b = b-c So that $R_1 = R_2$ (Identical) $\therefore \begin{vmatrix} -1 & -1 & a-b \\ -1 & -1 & b-c \\ x+3 & x+4 & x+c \end{vmatrix} = 0$	2 1 1
8.	Proving: One-one + Onto Finding Inverse	1 + 1 2
8.(OR)	Proving: Not Reflexive Not Symmetric Not Transitive + Conclusion	1 1 $1\frac{1}{2}+\frac{1}{2}$

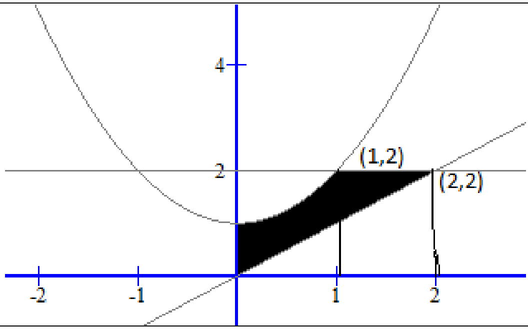
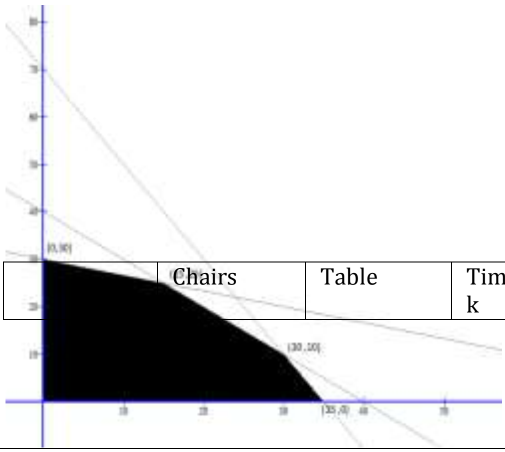
9.	$\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)=\tan^{-1}\left(\frac{\frac{1}{4}+\frac{2}{9}}{1-\frac{1}{4}.\frac{2}{9}}\right)=\tan^{-1}\left(\frac{1}{2}\right)$ $=\cos^{-1}\left(\frac{2}{\sqrt{5}}\right)$ Let $\cos^{-1}\left[\frac{2}{\sqrt{5}}\right]=\theta \Rightarrow \cos\theta=\frac{2}{\sqrt{5}}$ $\cos 2\theta = 2\cos^2\theta - 1$ $\therefore \theta=\frac{1}{2}\cos^{-1}(2\cos^2\theta-1)=\frac{1}{2}\cos^{-1}\frac{3}{5}$	2 1 1
10.	LHS= $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix}$ $=abc\begin{vmatrix} a+\frac{1}{a} & b & c \\ a & b+\frac{1}{b} & c \\ a & b & c+\frac{1}{c} \end{vmatrix}$ (taking a, b and c common R_1 ,R_2 and R_3.) $=\frac{abc}{abc}\begin{vmatrix} a^2+1 & b^2 & c^2 \\ a^2 & b^2+1 & c^2 \\ a^2 & b^2 & c^2+1 \end{vmatrix}$ (Applying $C_1 \to aC_1, C_2 \to bC_2$ and $C_3 \to cC_3$) Applying $C_1 \to C_1+C_2+C_3$ $=(a^2+b^2+c^2+1)\begin{vmatrix} 1 & 1 & 1 \\ a^2 & b^2+1 & c^2 \\ a^2 & b^2 & c^2+1 \end{vmatrix}=(a^2+b^2+c^2+1)(1)=(a^2+b^2+c^2+1)$	1 1 2
11.	Let $u=y^x, v=x^y$ and $w=x^x$ $\therefore u+v+w=a^b$ Differentiating both sides w.r.tx, $\frac{du}{dx}+\frac{dv}{dx}+\frac{dw}{dx}=0$..................(1) *Finding* $\frac{du}{dx}=y^x\left(\log y+\frac{x}{y}\frac{dy}{dx}\right), \frac{dv}{dx}=x^y\left(\frac{y}{x}+\log x.\frac{dy}{dx}\right)$ and $\frac{dw}{dx}=x^x(1+\log x)$ Substituting these values in equation (1) and finding $\frac{dy}{dx}=-\frac{y^x\log y+x^{y-1}y+x^x(1+\log x)}{y^{x-1}x+x^y\log x}$	$\frac{1}{2}$ $\frac{1}{2}$ 2 1
11.(OR)	$y=(\tan^{-1}x)^2$,	$\frac{1}{2}$

	Differentiating both sides w.r.t.x; $\frac{dy}{dx} = 2\tan^{-1} x.\frac{1}{1+x^2}$ Again differentiating both sides w.r.t.x, $\frac{d^2y}{dx^2} = 2\left(\frac{1}{1+x^2}.\frac{1}{1+x^2} + \tan^{-1} x\left(\frac{-2x}{(1+x^2)^2}\right)\right)$ *Simplifying* in the required form.	$1\frac{1}{2}$ 2
12.	$\lim_{x\to1^-} f(x) = 11 = \lim_{x\to1^+}$ $\lim_{h\to0} f(x-h) = 11 = \lim_{h\to0} f(x+h)$ $\Rightarrow 5a-2b = 11 = 3a+b$ Solving $5a-2b=11$ and $3a+b=11$ $a=3, b=2$	1 1 1 1
13.	Given curves, $y^2 = 4ax$ ....(1) and $xy = c^2$ ....(2) From (1) and (2), $x = \left(\frac{c^4}{4a}\right)^{1/3}$ ....(3) Let m_1 and m_2 are slopes of tangents to the curves (1) and (2) respectively. $m_1 = \frac{dy}{dx} = \frac{2a}{y}$ and $m_2 = \frac{dy}{dx} = -\frac{y}{x}$ $m_1.m_2 = \frac{2a}{y}\left(-\frac{y}{x}\right) = -\frac{2a}{x} = -\frac{2a}{\left(c^4/4a\right)^{1/3}} = -1$ Thus the given curves are orthogonal i.e. intersecting at right angles.	1 1 2
13.(OR)	$y = (x)^{1/4}$. Let $x = 81$ and $\Delta x = 1$ Then $\Delta y = (x+\Delta x)^{1/4} - x^{1/4} = (82)^{1/4} - 3$ Let $\therefore (82)^{1/4} = 3 + \Delta y$..............................(1) *Now*, $\Delta y = \frac{dy}{dx}.\Delta x = \frac{1}{108}$ $\therefore (82)^{1/4} = 3 + \frac{1}{108} = \frac{325}{108} = 3.0092$	1 1 1 1
14.	$I = \int \frac{(3\sin\theta - 2)\cos\theta}{5-\cos^2\theta - 4\sin\theta} d\theta. = \int \frac{(3\sin\theta-2)\cos\theta}{\sin^2\theta - 4\sin\theta + 4}$ Let $\sin\theta = t \therefore \cos\theta\, d\theta = dt$ $I = \int \frac{3t-2}{t^2-4t+4} dt = \frac{3}{2}\int \frac{2t-4}{t^2-4t+4} dt + 4\int \frac{1}{(t-2)^2} dt$ $= 3\log(t-2) - \frac{4}{t-2} + C$ $= 3\log(\sin\theta - 2) - \frac{4}{\sin\theta - 2} + C$	1 $\frac{1}{2}$ $1\frac{1}{2}$ 1
14.(OR)	Proving: $\int_0^a f(x)dx = \int_0^a f(a-x)dx$	1

	$I=\int_0^{\pi/2}\frac{\sin x}{\sin x+\cos x}dx \ldots\ldots\ldots(1)$ $=\int_0^{\pi/2}\frac{\sin\left(\frac{\pi}{2}-x\right)}{\sin\left(\frac{\pi}{2}-x\right)+\cos\left(\frac{\pi}{2}-x\right)}dx=\int_0^{\pi/2}\frac{\cos x}{\sin x+\cos x}\ldots\ldots\ldots(2)$ Adding (1) and (2), $2I=\int_0^{\pi/2}1\,dx=\frac{\pi}{2}$ $I=\int_0^{\pi/2}\frac{\sin x}{\sin x+\cos x}dx=\frac{\pi}{4}$	1 $1\frac{1}{2}$ $\frac{1}{2}$
15.	Let the centre of the circle is (a ,0).Therefore equation of circle is- $x^2-2ax+y^2=0 \ldots\ldots\ldots(1)$ *Differentiating* (1) w.r.t.x $x+y\frac{dy}{dx}=a \ldots\ldots\ldots(2)$ Eleminating a , using (1) and (2) We have ; $y^2=x^2+2xy\frac{dy}{dx}$ Required differential equation.	1 1 2
16.	Rewriting the given differential equation; $\frac{dy}{dx}+\frac{x-y}{x+y}=0$ $or, \frac{dy}{dx}+\frac{1-\frac{y}{x}}{1-\frac{y}{x}}=0\ldots\ldots\ldots(1)$ $Let\ \ v=\frac{y}{x};\therefore\frac{dy}{dx}=v+x\frac{dv}{dx}\ldots\ldots\ldots(2)$ *From* (1) and (2) $\frac{dx}{x}+\frac{1}{1+v^2}dv+\frac{1}{2}\frac{2v}{1+v^2}dv=0$ Integrating b/s, $\log x+\tan^{-1}v+\frac{1}{2}\log(1+v^2)=C$ $or, \log x+\tan^{-1}\frac{y}{x}+\frac{1}{2}\log\left(1+\frac{y^2}{x^2}\right)=C$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $1\frac{1}{2}$ 1

17.	$\vec a\times\vec c=\begin{vmatrix}\hat i & \hat j & \hat k\\ 1 & 1 & 1\\ x & y & z\end{vmatrix}=(z-y)\hat i+(x-z)\hat j+(y-x)\hat k$..........................(1) Let $\vec c=x\hat i+y\hat j+z\hat k$ $\quad \vec a\times\vec c=\vec b \Rightarrow (z-y)\hat i+(x-z)\hat j+(y-x)\hat k=\hat j-\hat k$ $\therefore y=z$.............(2), $x=1+z$..................(3), $y=x-1$.................(4) $\vec a.\vec c=3\Rightarrow x+y+z=3$..................................(5) $Finding,\ x=\frac{5}{3},\ y=\frac{2}{3},\ z=\frac{2}{3}$ $\therefore \vec c=\frac{1}{3}\left(5\hat i+2\hat j+2\hat k\right)$	1 1 1 1
18.	Comparing the given equations with, $\vec r=\vec a_1+\lambda\vec b_1$ and $\vec r=\vec a_2+\mu\vec b_2$ we have $\vec a_1-\vec a_2=-2\hat i+8\hat j-3\hat k$.............................(1) $\vec b_1\times\vec b_2=-\hat i+4\hat j-5\hat k$.............................(2) Shortest distance $=\left\|\frac{(\vec a_1-\vec a_2).(\vec b_1\times\vec b_2)}{\|\vec b_1\times\vec b_2\|}\right\|=\frac{49}{\sqrt{42}}$	1 1 2
19.	Let p:probability of guessing correct answer q : probability of guessing not correct answer. Therefore, p= $\frac{1}{4}$ and q= $\frac{3}{4}$ Let X=Number of correct answers by guessing X=0 ,1,2,3,4,5,6 $P(X\geq 5)=P(x=5)+P(X=6)$ $={}^6C_5\,p^5q^1+{}^6C_6\,p^6q^0$ $=\frac{19}{46}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $2\frac{1}{2}$
	SECTION C	
20.	AX=B $X=A^{-1}B$..........................(1) $A=\begin{bmatrix}4 & 2 & 3\\ 1 & 1 & 1\\ 3 & 2 & -2\end{bmatrix}, X=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$ and $B=\begin{bmatrix}2\\ 1\\ 5\end{bmatrix}$ $\|A\|=-9\neq 0,\therefore A^{-1} exists.$ $adjA=\begin{bmatrix}-4 & 10 & -1\\ 5 & -17 & -1\\ -1 & -1 & 2\end{bmatrix}$ $A^{-1}=\frac{adjA}{\|A\|}=-\frac{1}{9}\begin{bmatrix}-4 & 10 & -1\\ 5 & -17 & -1\\ -1 & -1 & 2\end{bmatrix}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 $\frac{1}{2}$

	$\therefore \begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{9}\begin{bmatrix} -4 & 10 & -1 \\ 5 & -17 & -1 \\ -1 & -1 & 2 \end{bmatrix}\begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix} = \begin{bmatrix} 1/3 \\ 4/3 \\ -2/3 \end{bmatrix}$ $x = \frac{1}{3}, y = \frac{4}{3}$ and $z = -\frac{2}{3}$	1 1
20.(or)	We know that, IA=A……………………………(1) Applying, $R_1 \leftrightarrow R_2$ $R_3 \to R_3 - 3R_1; R_1 \to R_1 - 2R_2; R_3 \to R_3 + 5R_2$ $R_3 \to \frac{1}{2}R_3; R_1 \to R_1 + R_2; R_2 \to R_2 - 2R_3$ $A^{-1} = \begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & -1 \\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$	1 ½ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$ $1\frac{1}{2}$
21.	Let the length and width of the window are x m and y m respectively. Perimeter of window=16 m. Therefore, $2x+3y=16$………………(1) Let area of the window is A. $A = xy + \frac{\sqrt{3}}{4}y^2$………………(2) $A = 8y - \frac{3}{2}y^2 + \frac{\sqrt{3}}{4}y^2$…………..(3) Differentiating (3) w.r.t.y $\frac{dA}{dy} = 8 - 3y + \frac{\sqrt{3}}{2}y$ *For* A to be maximum, $\frac{dA}{dy} = 0, \Rightarrow y = \frac{16}{6-\sqrt{3}}$ *Now*, $\frac{d^2A}{dy^2} < 0$ at $y = \frac{16}{6-\sqrt{3}}$ *Therefore*, A is maximum, when $y = \frac{16}{6-\sqrt{3}} m$.  	1 1 $1\frac{1}{2}$ $1\frac{1}{2}$ 1
21(OR).	Let edge of base is x unit and height is y unit. Volume, $V = x^2y$…………………(1), *given* Surface area ,A= $4xy + 2x^2$ …………….(2) From (1) and (2), $A = 4\frac{V}{x} + 2x^2$………………………..(3) Differentiating (3) w.r.t. x $\frac{dA}{dx} = -\frac{4V}{x^2} + 4x$………………(4) For A to be maximum, $\frac{dA}{dx} = 0, \Rightarrow x = y$  	1 1 1 ½ $2\frac{1}{2}$

	$\left(\frac{d^2A}{dx^2}\right)_{x=y} < 0$, Therefore A is maximum for $x = y$ i.e. the cuboid is a cube.	
22.	We know, $\int_a^b f(x)dx = \lim_{h\to 0} h\sum_{r=1}^{n} f(a+rh)$ Where, $nh = b-a$ and $n \to \infty$, Here $f(x) = x^2 - 2x + 2, a = 0$ and $b = 3$ $f(a+rh) = r^2h^2 - 2rh + 2, nh = 3$ $\therefore \int_0^3 (x^2 - 2x + 2)dx = \lim_{h\to 0} \sum_{r=1}^{n} (h^3r^2 - 2h^2r + 2h)$ $= \lim_{h\to 0}\left[\frac{nh(nh+h)(2nh+h)}{6} - nh(nh+h) + 2nh\right]$ $= 6$	1 1 2 $1\frac{1}{2}$ $\frac{1}{2}$
23.	Finding point of intersections. Curve tracing. Required Area $= \int_0^1 (x^2+1)dx + \int_1^2 2dx - \int_0^2 xdx$ $= \frac{4}{3}$ square unit. 	2 1 2 1
24.	Let the d.r's of line are a,b,c Equation of line passing through (1,2,3) is: $\frac{x-1}{a} = \frac{y-2}{b} = \frac{z-3}{c}$ ....(1) Line (1) is parallel to the given planes,therefore; $a - b + 2c = 0$ ....(2) and $3a + b + c = 0$ ....(3) *Solving* (2) and (3) for a, b, c We have, $a = -3k, b = 5k$ and $c = 4k$, where k is k is a constant. Required line is, $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(-3\hat{i} + 5\hat{j} + 4\hat{k})$	1 2 2 1
25.	Time required for 1 chair and 1 table and profit is as below: Let x chairs and y tables are manufactured. To maximize: Z=30 x +60 y ....(1) Subject to constraints: $x \ge 0, y \ge 0$ $2x + y \le 70$, $x + y \le 40$ and $x + 3y \le 90$  | | Chairs | Table | Time/week |	1 1 Graph: 2

Machine A	2 hrs	1 hrs.	70 hrs.
Machine B	1 hrs.	1 hrs	40 hrs.
Machine C	1 hrs.	3 hrs.	90 hrs.
Profit(in Rs.)	Rs 30/	Rs. 60/	

Corner point	**Z=30x+60y**
(0 ,30)	1800
(15,25)	**1950 Max**
(30,10)	1500
(35,0)	1050

Result: 1

1

Thus 15 chairs and 25 tables should be produced to maximize the profit.Max. Profit: RS.1950/

For proper statement

26. Let E_1 ,E_2 , and E_3 be the events of selection as manager of A, B and C respectively.

Then $P(E_1)=\frac{4}{4+1+2}=\frac{4}{7}; P(E_2)=\frac{1}{7}$ and $P(E_3)=\frac{2}{7}$ — 2

Let E be probabilit y of introducing a radical change. — 1

Then, $P(E|E_1)=0.3, P(E|E_2)=0.8; P(E|E_3)=0.5$ — 1

By Bayes' theorem ,the required probability= $P(E_2|E)+P(E_3|E|)$

$$=\frac{P(E_2).P(E_2|E)}{\sum P(E_i).P(E_i|E)}+\frac{P(E_3).P(E_3|E)}{\sum P(E_i).P(E_i|E)}=0.6$$ — 2