	MARKING SCHEME FOR PRE-BOARD-I SUBJECT MATHEMATICS CLASS-XII	
1.	D [1,2]	1
2.	C $f(\alpha+\beta)$	1
3.	A Null martix	1
4.	B -6, -4, -9	1
5.	D 0	1
6.	D 1	1
7.	B y	1
8.	C 6π	1
9.	C $\frac{3^{x+2}}{log3}+c$	1
10.	B $\sqrt{3}$	1
11.	B 2 sq. unit	1
12.	A $y=\frac{c}{x^2}$	1
13.	C x^2	1
14.	B -1	1
15.	B 0	1
16.	C 4	1
17.	C given by corner points of the feasible region	1
18.	C $\frac{1}{3}$	1
19.	D Assertion is false but reason is true	1
20.	A both Assertion and Reason are true and Reason is the correct explanation of Assertion	1
	Section B	
21.	$\sin\{2(\pi-cot^{-1}\frac{5}{12})\}$ $= -\sin(2tan^{-1}\frac{12}{5})$ …= $-\sin\left(sin^{-1}\frac{120}{169}\right)=-\frac{120}{169}$	½ ½ 1
22.	$\lim_{x\to0^-}\frac{sin3x}{tan5x}$ $=\lim_{x\to0^-}\frac{sin3x}{3x}\times\frac{5x}{tan5x}\times\frac{3}{5}=\frac{3}{5}$ RHL = k $\Rightarrow k=\frac{3}{5}$	1 1
23.	Taking logarithm both sides 6logx+5logy=11 log(x+y) Diff. Both sides w.r.t. x we get 6/x +(5/y)$\frac{dy}{dx}$ = {11/(x+y)}(1+$\frac{dy}{dx}$) $\Rightarrow$ ……. $\Rightarrow\frac{dy}{dx}=(\frac{y}{x})$	½ ½ 1
24.	$\vec{a}.\vec{b}$ =0.y -16+x = 0 $\Rightarrow$ x = 16 $\lvert\vec{a}\rvert = \lvert\vec{b}\rvert \Rightarrow 64+x^2 = y^2+4+1$ 64+256 = y^2 +5 $\Rightarrow y=\pm\sqrt{315}$ **OR** $\overrightarrow{(a+b)}^2=(-\vec{c})^2\Rightarrow a^2+b^2+2\vec{a}.\vec{b}=c^2$ $\vec{a}.\vec{b}$ = 15 $\Rightarrow 2abcos\theta$ = 15 cosθ = ½ ⟹θ = 60^o	½ ½ 1 ½ ½ 1

<table>
<tr><td>25.</td><td>$\frac{(\vec{p}+\vec{q})X(\vec{p}-\vec{q})}{|(\vec{p}+\vec{q})X(\vec{p}-\vec{q})|}$
$= (26\hat{\imath} + 8\hat{\jmath} - 22\hat{k})/\sqrt{1224} = \frac{1}{3\sqrt{34}}(13\hat{\imath} + 4\hat{\jmath} - 11\hat{k})$</td><td>1

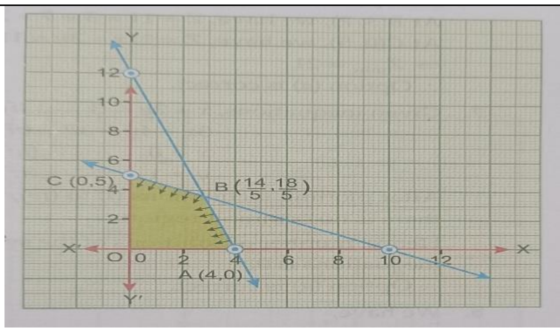
1</td></tr>
<tr><td></td><td>SECTION-C</td><td></td></tr>
<tr><td>26.</td><td>Let l (=b^2) and 'b' be the length and breadth respectively of the rectangle
$\therefore$ A, the area $= l \times b = b^2 \times b = b^3$
$\therefore \frac{dA}{dt} = 3b^2\frac{db}{dt} \Rightarrow 48 = 3b^2\frac{db}{dt}$ ... (1) [By the question]
But $l = b^2 \Rightarrow \frac{dl}{dt} = 2b\frac{db}{dt}$............(2)
$\Rightarrow \frac{dl}{dt} = 2b \cdot \frac{1}{3b^2}\frac{dA}{dt}$
$= \frac{2}{3b}\frac{dA}{dt}$
$\Rightarrow \frac{dl}{dt}\Big|_{b=4.5} = \frac{2\times48}{3\times4.5} = 7.11$ cm/sec</td><td>1

1

1</td></tr>
<tr><td>27.</td><td>For increasing $f'(x) = \frac{cosx-sinx}{1+(sinx+cosx)^2} > 0$
$\Longrightarrow$ cosx-sinx > 0 $\Longrightarrow x \in (0, \pi/4)$
For decreasing $f'(x) < 0 \Longrightarrow cosx < sinx \Longrightarrow x \in (\frac{\pi}{4}, \pi)$</td><td>1
1
1</td></tr>
<tr><td>28.</td><td>Put logx = t $\Longrightarrow x = e^t \Longrightarrow dx = e^t$ dt
I=$\int(\frac{1}{t} - \frac{1}{t^2})\, e^t dt$ $= e^t \cdot \frac{1}{t}$ + C $= \frac{x}{logx}$ + C</td><td>1
2</td></tr>
<tr><td>29</td><td>$\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2} = k \Longrightarrow (x,y,z)$ =Q(3k-2,2k-1,2k+3)
P(1,3,3) , PQ = $\sqrt{((3k-3)^2 + (2k-4)^2 + 4k^2)} = 5 \Longrightarrow$ ... $k = 0,2$
Point (-2,-1,3) or (4,3,7)
OR
D.r.'s $\vec{b_1}(3,-16,7), \vec{b_2}(3,8,-5)$,
$\vec{b}$ is perpendicular to $\vec{b_1}$ and $\vec{b_2}$ so $\vec{b} = \vec{b_1} \times \vec{b_2}$ = $\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & -16 & 7 \\ 3 & 8 & -5 \end{vmatrix} = 24\hat{i} + 36\hat{j} + 72\hat{k}$
So, the required equation of line is $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda_1(24\hat{i} + 36\hat{j} + 72\hat{k})$</td><td>1
1
1

1
1
1</td></tr>
<tr><td>30.</td><td><table><tr><td>Z at (4,0)</td><td>40</td></tr><tr><td>Z at (14/5,18/5)</td><td>82</td></tr><tr><td>Z at (0,5)</td><td>75</td></tr><tr><td>Z at (0,0)</td><td>0</td></tr></table>
Z is maximum at $x = \frac{14}{5}, y = \frac{18}{5}$ and maximum value of z is 82.</td><td>1.5

1.5</td></tr>
</table>



31. Sample space = {BB,BG,GB,GG} — ½

(i) A= both are girls={GG}

B= youngest is a girl ={BG,GG} — 1

$P(A/B)=\frac{P(A\cap B)}{P(B)}$=1/2 — ½

(ii) C = at least one girl = {BG,GB, GG} — 1

$$P\left(\frac{A}{C}\right)=\frac{P(A\cap C)}{P(C)}=\frac{1}{3}$$

OR

Total bulbs 2+8=10 — ½

X= no. of defective bulbs 0,1,2

X	0	1	2
P(X)	28/45	16/45	1/45

— 1.5

— 1

Mean $=\sum p_i x_i$=…=2/5

SECTION D

32. |A|=1200 , $adj(A)=\begin{pmatrix}75 & 110 & 72\\ 150 & -100 & 0\\ 75 & 30 & -24\end{pmatrix}$, — 2

$$A^{-1}=\frac{adj(A)}{|A|}=\frac{1}{1200}\begin{bmatrix}75 & 110 & 72\\ 150 & -100 & 0\\ 75 & 30 & -24\end{bmatrix}$$ — 1

System of equations become A'X=B where X = $\begin{bmatrix}1/x\\ 1/y\\ 1/z\end{bmatrix}$ and B = $\begin{bmatrix}2\\ 5\\ -4\end{bmatrix}$ — 2

X = $(A')^{-1}$B = $(A^{-1})'$ B = …= $\begin{bmatrix}1/2\\ -1/3\\ 1/5\end{bmatrix}$, x=2,y= -3 and z= 5

33. dx/dt = cost, dy/dt = pcospt , dy/dx = pcospt/cost , — 1

$\frac{d^2y}{dx^2}$ = (- p^2sinpt +pcospt.tant)/cos^2t — 2

(1-x^2)$\frac{d^2y}{dx^2}-x\frac{dy}{dx}+p^2y$ = $-p^2 sinpt+pcospt.tant-\frac{sint}{cost}.pcospt+p^2 sinpt = 0$ — 2

OR

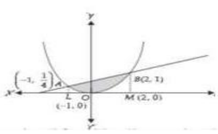
$\frac{dx}{d\theta}$ = -asinΘ + bcosΘ ,$\frac{dy}{d\theta}$ = acosΘ+bsinΘ , dy/dx = ..= -x/y. — 2

$\frac{d^2y}{dx^2}$ =-($\frac{y-x\frac{dy}{dx}}{y^2}$) , — 2

$y^2\frac{d^2y}{dx^2}$ -x$\frac{dy}{dx}+y=0$ — 1

34. To find Intersection point of the curve

x^2 = 4y and x = 4y -2



we solve these equation .

Putting 4y= x+2 in x^2 = 4y we get ,

	$x^2 = x + 2$ $\Rightarrow x^2 - x - 2 = 0$ $\Rightarrow (x-2)(x+1) = 0 \Rightarrow x = 2, -1$ $when\ x = -1$, $y = \frac{1}{4}$ and $x = 2 \Rightarrow y = 1$ So the intersection point of these two curve are A $(-1, \frac{1}{4})$ and B $(2,1)$ $Now\ required\ Area = \int_{-1}^{2} \frac{x+2}{4} dx - \int_{-1}^{2} \frac{x^2}{4} dx = \int_{-1}^{2} (\frac{x+2}{4} - \frac{x^2}{4}) dx = \left[\frac{x^2}{8} + \frac{x}{2} - \frac{x^3}{12}\right]_{-1}^{2} =$ $\frac{3}{8} + \frac{3}{2} - \frac{3}{4} = \frac{9}{8}$ So Area bounded by the curve $x^2 = 4y$ and the line $x = 4y-2$ is $\frac{9}{8}$ square unit .	1 1 2
35.	$\frac{x+1}{2} = \frac{y-3}{-2} = \frac{z}{-1} = k \rightarrow (x,y,z) = P(2k-1, -2k+3, -k)$ be the foot of the perpendicular from A(1,2,-3) . d.r. AP (2k-2,-2k+1,-k+3) is perpendicular to line with d.r.(2,-2,-1) 2(2k-2)-2(-2k+1)-1(-k+3) = 0 . So k=1 $\rightarrow$ $foot\ of\ perpendicular\ (1,1,-1)$ Image of point A is (1,0,1) **OR** $\frac{x-1}{2} = \frac{y-a}{3} = \frac{z-3}{4} = k\ (say) \rightarrow (x,y,z) = (2k+1, 3k+a, 4k+3)$ $\frac{x-4}{5} = \frac{y-1}{2} = z$ = m (say) , (x,y,z) = (5m+4,2m+1,m) Lines intersect $\rightarrow$ $(2k+1, 3k+a, 4k+3)$ =(5m+4,2m+1,m) k=-1, m= -1 a=2 point of intersection is (-1,-1,-1).	1 1 2 1 1 1 1 1 1
	SECTION E	
36.	(i) not injective as let a=1,b=-1 , a $\neq b$, $but\ f(a) = f(b) = 3a^2 = 3b^2 = 3$ (ii) not bijective as for f(x)= 7 there is no natural no. x for which f(x)= $3x^2$ **(iii) bijective as f is both one-one and onto** OR Range of function is $\{3x^2, x \in N\} = \{3,12,27,48, \ldots\}$ f(3) =27	1 1 2
37.	(i) $y = 4x - (x^2/2)$, dy/dx = 4-x So rate of growth the plant is (4-x) cm per day. (ii) For maximum height dy/dx =0 , x=4.now $\frac{d^2y}{dx^2}$ = -1<0 at x=4. Hence y is maximum at x=4 or it will take 4 days for the plant to grow to the maximum height. (iii)As y is maximum at x=4,so maximum height of plant $\{y\}_{x=4}$ =4x4- $(1/2)4^2$ =8 cm OR As y=4x- $(1/2)x^2$, at x=2 , y= 6 cm. Height of the plant after 2 days is 6 cm	1 1 2
38.	(i) P(E_1) = 3/5 (ii) P(E/E_1) = P(student answers correctly given that he knows the answer)=1 (iii) $\sum_{k=1}^{2} P(E/E_k)P(E_k) = P(E/E_1)P(E_1)$ + P(E/E_2) P(E_2) = 1x(3/5) + (1/3)x(2/5) = 11/15 OR P(E_1/E) = $\frac{P(E/E_1)P(E_1)}{P(\frac{E}{E_1})P(E_1)+P(E/E_2)P(E_2)} = \frac{\frac{1X3}{5}}{\frac{1X3}{5}+(\frac{1}{3})X2/5}$ = …=9/11	1 1 2