D. A. V PUBLIC HEHAL, RANCHI
Practice Text - 3

26.12.17

Marking Scheme (Mathematics XII 2017-18)

Sr. No.	Answer	Mark(s)
	Section A	
1.	Yes It is symmetric	[1]
2.	-15	[1]
3.	(or any other correct answer) $[\hat{i}\,\hat{j}\,\hat{k}] = \hat{i}\cdot(\hat{j}\times\hat{k}) = \hat{i}\cdot\hat{i} = 1$	[1]
4.	$(1*2)*3 = 2^2*3 = 2^{12}, 1*(2*3) = 1*2^6 = 2^{64}\ \therefore (1*2)*3 \neq 1*(2*3)$. Hence, $*$ is not associative.	[1]
	Section B	
5.	$\Rightarrow 4\sin^{-1}x + \frac{\pi}{2} - \sin^{-1}x = \pi$ $\Rightarrow 3\sin^{-1}x = \frac{\pi}{2} \Rightarrow \sin^{-1}x = \frac{\pi}{6} \Rightarrow x = \sin\frac{\pi}{6} = \frac{1}{2}$	[1] [1]
6.	$\begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}^{-1} = \frac{1}{9-10}\begin{bmatrix} -3 & -2 \\ -5 & -3 \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix}$ $P = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}\begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 13 & 8 \\ 1 & 1 \end{bmatrix}$	[1 + ½] [½]
12.	$\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right) = \tan^{-1}\left(\frac{\cos^2\frac{x}{2} - \sin^2\frac{x}{2}}{(\cos\frac{x}{2} + \sin\frac{x}{2})^2}\right)$ $= \tan^{-1}\left[\frac{\cos\frac{x}{2} - \sin\frac{x}{2}}{\cos\frac{x}{2} + \sin\frac{x}{2}}\right] = \tan^{-1}\left[\frac{1-\tan\frac{x}{2}}{1+\tan\frac{x}{2}}\right]$ $= \tan^{-1}\tan\left(\frac{\pi}{4} - \frac{x}{2}\right) = \left(\frac{\pi}{4} - \frac{x}{2}\right)$	[½] [1] [½]
7.	Let $y = \frac{1}{x^2}$. Then $\frac{dy}{dx} = \frac{-2}{x^3}$. $dy = (\frac{dy}{dx})_{x=2} \times \triangle x = \frac{-2}{2^3} \times 0.002 = -0.0005$. y decreases by 0.0005.	[1/2] [1] [1/2]
8.	$\int e^x \frac{\sqrt{1+\sin 2x}}{1+\cos 2x}dx = \int e^x \frac{\sqrt{(\sin x + \cos x)^2}}{2\cos^2 x}dx$ $= \frac{1}{2}\int e^x(\frac{\sin x}{\cos^2 x} + \frac{\cos x}{\cos^2 x})dx = \frac{1}{2}\int e^x(\sec x + \sec x \tan x)dx$ $= \frac{1}{2}e^x \sec x + c \left[\because \int e^x(f(x)+f'(x))dx = e^x f(x) + c\right]$	[1/2] [1/2] [1]

10. 9	$ax^2+by^2=1 \Rightarrow 2ax+2byy_1=0 \Rightarrow ax+byy_1=0$ (1) $\Rightarrow a+b[yy_2+{y_1}^2]=0 \Rightarrow a=-b[yy_2+{y_1}^2]$ (2) Substituting this value, for a in the equation (1), we get, $-b[yy_2+{y_1}^2]x+byy_1=0 \Rightarrow x[yy_2+{y_1}^2]=yy_1$. Hence verified	[1/2] [1] [1/2]
11. 10	$\vec{a}=2\hat{i}-\hat{j}+\hat{k}, \vec{b}=\hat{i}-2\hat{j}+\hat{k}, \vec{a}\cdot\vec{b}=5, \lvert\vec{b}\rvert=\sqrt{6}.$ The required Projection (vector) of $\vec{a}$ on $\vec{b}=\dfrac{\vec{a}\cdot\vec{b}}{\lvert\vec{b}\rvert^2}\vec{b}$ $=\dfrac{5}{6}(\hat{i}-2\hat{j}+\hat{k}).$	[1/2] [1] [1/2]
12. 11.	$P(B/A)=\dfrac{P(A\cap B)}{P(A)} \Rightarrow P(A\cap B)=0.4\times 0.6=0.24$ $P(A/B)=\dfrac{P(A\cap B)}{P(B)}=\dfrac{0.24}{0.80}=\dfrac{3}{10}$	[1] [1]
	Section C	
13.	Let $\Delta_1=\begin{vmatrix} a^3-1 & 0 & a-a^4 \\ 0 & a-a^4 & a^3-1 \\ a-a^4 & a^3-1 & 0 \end{vmatrix}=\begin{vmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \end{vmatrix}$ Where C_{ij} = the cofactor of a_{ij} and a_{ij} = the (i, j)th element of determinant Δ. We know that $\begin{vmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \end{vmatrix}=\Delta^2$ $\therefore \Delta_1=\Delta^2=(-4)^2=16$	[2] [1] [1]
14.	Since, f is differentiable at 1, f is continuous at 1. Hence, $\lim_{x\to 1^+} f(x)=\lim_{x\to 1^+}(2x+1)=3$ $\lim_{x\to 1^-} f(x)=\lim_{x\to 1^-}(ax^2+b)=a+b$ f(1) = 3 As f is continuous at 1, we have a + b = 3 .... (1) $Lf'(1)=\lim_{h\to 0^-}\dfrac{f(1-h)-f(1)}{-h}=\lim_{h\to 0^+}\dfrac{a(1-h)^2+b-3}{-h}$ $=\lim_{h\to 0^+}\dfrac{a+ah^2-2ah+b-3}{-h}=\lim_{h\to 0^+}(-ah+2a)$ (using (1)) = 2a $Rf'(1)=\lim_{h\to 0^+}\dfrac{f(1+h)-f(1)}{h}=\lim_{h\to 0^+}\dfrac{2(1+h)+1-3}{h}=2.$ As f is differentiable at 1, we have 2 a = 2, i. e., a = 1 and b = 2. **OR**	[1] [1/2] [1/2] [1/2] [1/2] [1/2] [1/2]

	$\lim_{x\to 0^-} f(x) = \lim_{x\to 0^-} \frac{x+\sin x}{\sin(a+1)x}$	[1/2]
	$= \lim_{x\to 0^-} \frac{1+\frac{\sin x}{x}}{\frac{\sin(a+1)x}{(a+1)x}(a+1)} = \frac{2}{a+1}$	[1/2]
	$\lim_{x\to 0^+} f(x) = \lim_{x\to 0^+} 2\frac{e^{\sin bx}-1}{bx}$	[1/2]
	$= \lim_{x\to 0^+} 2\frac{e^{\sin bx}-1}{\sin bx} \times \frac{\sin bx}{bx} = 2$	
	f(0) = 2.	[1/2]
	For the function to be continuous at 0, we must have $\lim_{x\to 0^+} f(x) = \lim_{x\to 0^-} f(x) = f(0)$	[1/2]
	i.e., we must have $\frac{2}{a+1} = 2 \Rightarrow a = 0;$ b may be any real number other than 0.	[1/2] [1]
15.	$y = \log(\sqrt{x}+\frac{1}{\sqrt{x}})^2 = 2\log(\frac{x+1}{\sqrt{x}}) = 2[\log(x+1) - \frac{1}{2}\log x]$	[1]
	$y_1 = 2[\frac{1}{x+1} - \frac{1}{2}\times\frac{1}{x}] = \frac{x-1}{x(x+1)}$ (1)	[1]
	$y_2 = \frac{x(x+1)-(x-1)(2x+1)}{x^2(x+1)^2} = \frac{-x^2+2x+1}{x^2(x+1)^2}$	[1]
	$\Rightarrow x(x+1)^2 y_2 = \frac{-x^2+2x+1}{x} = \frac{2x-(x+1)(x-1)}{x} = 2-(x+1)^2 y_1$ (using (1))	
	$\Rightarrow x(x+1)^2 y_2 + (x+1)^2 y_1 = 2.$ Hence, proved.	[1]
16.	When y = 0, we have $(x-1)(x^2+x+1)(x-2) = 0$, i.e., x = 1 or 2.	[1/2]
	$\frac{dy}{dx} = x^3 - 1 + (x-2)3x^2 = 4x^3 - 6x^2 - 1$	[1/2]
	$(\frac{dy}{dx})_{(1,0)} = -3$	[1/2]
	$(\frac{dy}{dx})_{(2,0)} = 7.$	[1/2]
	The required equations of the tangents are y – 0 = -3 (x – 1) or, y = -3x + 3 and y – 0 = 7(x – 2) or, y = 7x – 14.	[2]
	OR	
	Domain f = $(-1,\infty)$ $f'(x) = \frac{-3}{1+x} + \frac{4}{(2+x)} + \frac{4}{(2+x)^2} = \frac{x(x+4)}{(1+x)(2+x)^2}.$	[1]
	$f'(x) = 0 \Rightarrow x = 0$ $[x \neq -4$ as $-4 \notin (-1,\infty)].$	[1]
	In (-1, 0), $f'(x) = \frac{(-ve)(+ve)}{(+ve)(+ve)} = -ve$. Therefore, f is strictly decreasing in (-1, 0].	[1]
	In $(0,\infty)$, $f'(x) = +ve$. Therefore, f is strictly increasing in $[0,\infty)$.	[1]

17\. Let $AL = x$ $MC = r$ $AM = h$ (Given)

$LM = h - x$ $\Delta ALO \sim \Delta AMC$ [1]

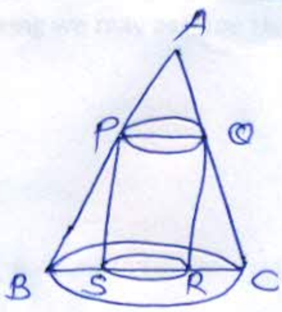
$LO = \frac{rx}{h}$

$V = \pi \frac{r^2 x^2}{h}(h-x)$ [1]

$\frac{dV}{dx} = \frac{\pi r^2}{h^2} x(2h-3x) = 0$ $x = \frac{2h}{3}$ [1]

$\frac{d^2V}{dx^2} = \frac{\pi r^2}{h^2}(-2h) < 0$ at $x = \frac{2h}{3}$ [1]

Height of cylinder $= h - x = h - \frac{2h}{3} = h/3$



18\. $\int \frac{\sec x}{1+\operatorname{cosec} x}dx = \int \frac{\sin x}{\cos x(1+\sin x)}dx = \int \frac{\sin x \cos x}{(1+\sin x)^2(1-\sin x)}dx$ [1]

$= \int \frac{t}{(1+t)^2(1-t)}dt$ $[\sin x = t \Rightarrow \cos x dx = dt]$

$\frac{t}{(1+t)^2(1-t)} = \frac{A}{1+t} + \frac{B}{(1+t)^2} + \frac{C}{1-t} \Rightarrow t = A(1+t)(1-t) + B(1-t) + C(1+t)^2$

(an identity)

Put t = -1, - 1 = 2 B, i.e., B = -½. Put, t = 1, 1 = 4C, i.e., C = ¼. Put t = 0, 0 = A + B + C, which gives A = $\frac{1}{4}$. [1+ 1/2]

Therefore the required integral $= \frac{1}{4}\int \frac{1}{1+t}dt + \frac{-1}{2}\int \frac{1}{(1+t)^2}dt + \frac{1}{4}\int \frac{1}{(1-t)}dt$

$= \frac{1}{4}\log|1+t| + \frac{-1}{2} \times \frac{-1}{1+t} - \frac{1}{4}\log|1-t| + c$

$= \frac{1}{4}\log|1+\sin x| + \frac{1}{2} \times \frac{1}{1+\sin x} - \frac{1}{4}\log|1-\sin x| + c$ [1 + 1/2]

19\. The given differential equation is $ye^y dx = (y^3 + 2xe^y)dy, y(0) = 1$ [1]

or, $\frac{ye^y}{(y^3+2xe^y)} = \frac{dy}{dx}$ $or, \frac{dx}{dy} + (-\frac{2}{y})x = \frac{y^2}{e^y}$, which is linear in x.

I. F. $= e^{\int \frac{-2}{y}dy} = e^{-2\log y} = \frac{1}{y^2}$ [1]

Multiplying both sides by the I. F. and integrating, we get, $x\frac{1}{y^2} = \int e^{-y}dy$ [1/2]

$\Rightarrow x\frac{1}{y^2} = -e^{-y} + c \Rightarrow x = -y^2e^{-y} + cy^2$ (the general solution). [1]

When x = 0, y = 1. $0 = -e^{-1} + c \Rightarrow c = \frac{1}{e}$. Hence, the required particular solution is

$x = -y^2e^{-y} + \frac{y^2}{e}$. [1/2]

OR

<table>
<tr><td></td><td>The given differential equation is $(x-y)dy=(x+2y)dx$ $or, \frac{dy}{dx}=\frac{x+2y}{x-y}=\frac{1+2\frac{y}{x}}{1-\frac{y}{x}}=f(\frac{y}{x}),$
hence, homogeneous.
Put y = v x $\Rightarrow \frac{dy}{dx}=v+x\frac{dv}{dx}$. The equation becomes $v+x\frac{dv}{dx}=\frac{1+2v}{1-v}$ $or, \frac{1-v}{v^2+v+1}dv=\frac{dx}{x}$
$or, \frac{-1}{2}\times\frac{2v+1-3}{v^2+v+1}dv=\frac{dx}{x}$ $or, [\frac{2v+1}{v^2+v+1}+\frac{-3}{v^2+2v\times\frac{1}{2}+(\frac{1}{2})^2+\frac{3}{4}}]dv=\frac{-2dx}{x}$
Integrating, we get $\int\frac{2v+1}{v^2+v+1}dv+\int\frac{-3}{(v+\frac{1}{2})^2+(\frac{\sqrt{3}}{2})^2}dv=\int\frac{-2dx}{x}$
or, $\log(v^2+v+1)-\frac{3\times2}{\sqrt{3}}\tan^{-1}\frac{v+\frac{1}{2}}{\frac{\sqrt{3}}{2}}=-2\log\lvert x\rvert+c$
or, $\log(y^2+xy+x^2)-2\sqrt{3}\tan^{-1}\frac{2y+x}{\sqrt{3}x}=c$ (the general solution).</td><td>[1]
[1]
[2]</td></tr>
<tr><td>20.</td><td>$\vec{a}\times(\vec{a}+\vec{b}+\vec{c})=\vec{a}\times\vec{0}$
$\Rightarrow\vec{a}\times\vec{b}+\vec{a}\times\vec{c}=\vec{0}\Rightarrow\vec{a}\times\vec{b}=\vec{c}\times\vec{a}$
$\vec{b}\times(\vec{a}+\vec{b}+\vec{c})=\vec{b}\times\vec{0}$
$\Rightarrow\vec{b}\times\vec{c}=\vec{a}\times\vec{b}\therefore\vec{a}\times\vec{b}=\vec{b}\times\vec{c}=\vec{c}\times\vec{a}$
$\begin{bmatrix}\vec{a} & \vec{b} & \vec{c}\end{bmatrix}=\vec{a}\cdot(\vec{b}\times\vec{c})=\vec{a}\cdot(\vec{a}\times\vec{b})$
$=0$ [As the scalar triple product of three vectors is zero if any two of them are equal.]</td><td>[1]
[1]
[1/2]
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[1/2]</td></tr>
<tr><td>21.</td><td>Equation of Plane pt $(1,4,6)$ is
$a(x-1)+b(y-4)+c(z-6)=0$ —(1)
is $\perp$ to line $\frac{x-1}{4}=\frac{y-2}{5}=\frac{z-3}{6}$
but Normal to plane ∥ to line
$\frac{a}{4}=\frac{b}{5}=\frac{c}{6}=K$
$a=4K$ $b=5K$ $c=6K$
Put (1)
$4K(x-1)+5K(y-4)+6K(z-6)=0$
$4(x-1)+5(y-4)+6(z-6)=0$ $K\neq0$
$4x-4+5y-20+6z-36=0$
$\boxed{4x+5y+6z-60=0}$</td><td>[1/2]
[1/2]
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[1/2]</td></tr>
</table>

22. Let E_1 = Bag I is chosen, E_2 = Bag II is chosen, E_3 = Bag III is chosen, A = The two balls drawn from the chosen bag are white and red. [1]

$$P(E_1)=\frac{1}{3}=P(E_2)=P(E_3),$$

$$P(A\mid E_1)=\frac{1}{6}\times\frac{3}{6}\times 2,\ P(A\mid E_2)=\frac{2}{4}\times\frac{1}{4}\times 2,\ P(A\mid E_3)=\frac{4}{9}\times\frac{2}{9}\times 2.$$ [2]

By Bayes's Theorem, the required probability =

$$P(E_3\mid A)=\frac{P(E_3)\times P(A\mid E_3)}{\sum_{i=1}^{3}P(E_i)\times P(A\mid E_i)}=\frac{\frac{1}{3}\times\frac{4}{9}\times\frac{2}{9}\times 2}{\frac{1}{3}\times\frac{1}{6}\times\frac{3}{6}\times 2+\frac{1}{3}\times\frac{2}{4}\times\frac{1}{4}\times 2+\frac{1}{3}\times\frac{4}{9}\times\frac{2}{9}\times 2}=\frac{64}{199}.$$ [1]

23. Let X denotes the random variable. Then X = 0, 1, 2.

$$P(X=0)=\frac{{}^{16}c_2}{{}^{20}c_2}=\frac{60}{95},\ P(X=1)=\frac{{}^{4}c_1\times{}^{16}c_1}{{}^{20}c_2}=\frac{32}{95},\ P(X=2)=\frac{{}^{4}c_2}{{}^{20}c_2}=\frac{3}{95}.$$ [1 + 1/2]

x_i	p_i	x_ip_i	$x_i^2p_i$
0	60/95	0	0
1	32/95	32/95	32/95
2	3/95	6/95	12/95
total		38/95	44/95

[1/2]

Mean = $\sum_{i=1}^{3}x_ip_i=\frac{38}{95}=\frac{2}{5}$ [1/2]

Variance = $\sum_{i=1}^{3}x_i^2p_i-(\sum_{i=1}^{3}x_ip_i)^2=\frac{44}{95}-\frac{4}{25}=\frac{144}{475}.$ [1 +1/2]

Section D

24. 28

$f\circ g:\mathbb{R}\to\mathbb{R}$ defined by $f\circ g(x)=f(g(x))=f(x^3+5)=2(x^3+5)-3=2x^3+7$ [1]

Let $x_1,x_2\in\mathbb{R}(D_{f\circ g})$ such that

$f\circ g(x_1)=f\circ g(x_2)\Rightarrow 2x_1^3+7=2x_2^3+7\Rightarrow x_1^3=x_2^3\Rightarrow x_1=x_2$. Hence, $f\circ g$ is one-one. [1]

Let $y\in\mathbb{R}(Codomain_{f\circ g})$. Then for any x $f\circ g$ (x) = y if 2 x^3 + 7 = y, i.e., if, 2 x^3 = y – 7, i.e., x = $\sqrt[3]{\frac{y-7}{2}}$, which $\in\mathbb{R}(D_{f\circ g})$. Hence, for every $y\in\mathbb{R}(Codomain_{f\circ g}),\exists\sqrt[3]{\frac{y-7}{2}}\in\mathbb{R}(D_{f\circ g})$ [2]

such that $f\circ g(\sqrt[3]{\frac{y-7}{2}})=y$. Hence,

$f\circ g$ is onto.

Since, $f\circ g$ is both one-one and onto, it is invertible. [1/2]

$(f\circ g)^{-1}:\mathbb{R}\to\mathbb{R}$ defined by $(f\circ g)^{-1}(x)=\sqrt[3]{\frac{x-7}{2}}$ [1]

$(f\circ g)^{-1}(9)=\sqrt[3]{\frac{9-7}{2}}=1.$ [1/2]

OR

Let $a,b\in\mathbb{R}$ such that a = 0, b $\neq$ 0.

Then $a*b=|a|+b=|0|+b=b, b*a=b, \therefore a*b=b*a$ [1]

Let $a,b\in\mathbb{R}$ such that a $\neq$ 0, b = 0. [1]

Then $a*b=a, b*a=|b|+a=|0|+a=a, \therefore a*b=b*a$

Let $a,b\in\mathbb{R}$ such that a = 0, b = 0. Then $a*b=a=0, b*a=b=0, \therefore a*b=b*a$. [1]

Now we need to check whether * is commutative. One more case is needed to be examined. Let $a,b\in\mathbb{R}$ such that a $\neq$ 0, b $\neq$ 0. Then $a*b=|a|+b, b*a=|b|+a$ and $a*b$ may not be equal to $b*a$, e.g., (-1) * 2=3, 2 * (-1) = 1, hence, (-1) * 2 $\neq$ 2 * (-1). Thus * is not commutative. [1]

The element $e\in\mathbb{R}$ will be the identity element for * if a * e = e * a = a for all $a\in\mathbb{R}$.

$a*e=a$ provided e = 0 and $e*a=a$ provided e = 0 (As $0*0=0$ and $0*a=|0|+a=a$ for a $\neq$ 0). Hence, 0 is the identity element for * . [2]

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27. $|A|=3(3-6)+(-2)(-12-14)+1(12+7)=62\neq 0.$ [1]

Hence, A^{-1} exists. Let c_{ij} represent the cofactor of (i, j)th element of A. Then,

$c_{11}=-3, c_{12}=26, c_{13}=19, c_{21}=9, c_{22}=-16, c_{23}=5, c_{31}=5, c_{32}=-2, c_{33}=-11.$

adjA = $\begin{bmatrix}-3 & 9 & 5\\ 26 & -16 & -2\\ 19 & 5 & -11\end{bmatrix}$

$$A^{-1}=\frac{1}{62}\begin{bmatrix}-3 & 9 & 5\\ 26 & -16 & -2\\ 19 & 5 & -11\end{bmatrix}$$ [2]

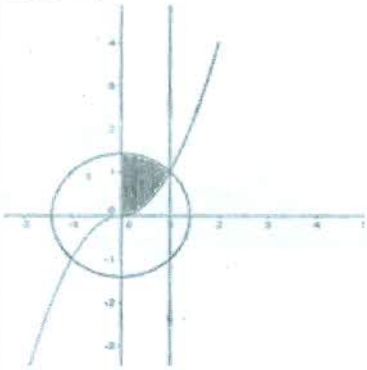
The given system of equations is equivalent to the matrix equation

$$A'X=B, \text{ where } X=\begin{bmatrix}x\\ y\\ z\end{bmatrix}, B=\begin{bmatrix}14\\ 4\\ 0\end{bmatrix}.$$

$\Rightarrow X=(A')^{-1}B=(A^{-1})'B$ [1]

$=\frac{1}{62}\begin{bmatrix}-3 & 26 & 19\\ 9 & -16 & 5\\ 5 & -2 & -11\end{bmatrix}\begin{bmatrix}14\\ 4\\ 0\end{bmatrix}=\frac{1}{62}\begin{bmatrix}62\\ 62\\ 62\end{bmatrix}=\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}$ Hence, x = 1, y = 1, z = 1 [2]

OR

	$\begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} A \Rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 1 \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} A \ (R_1 \leftrightarrow R_2)$	[1]
	$\Rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & -1 \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -2 & 0 \\ 0 & 0 & 1 \end{bmatrix} A \ (R_2 \to R_2 - 2R_1)$	[1]
	$\Rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -2 & 0 \\ -2 & 4 & 1 \end{bmatrix} A \ (R_3 \to R_3 - 2R_2)$	[1]
	$\Rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 2 & -3 & -1 \\ -1 & 2 & 1 \\ -2 & 4 & 1 \end{bmatrix} A \ (R_2 \to R_2 + R_3, R_1 \to R_1 - R_3)$	[1]
	$\Rightarrow A^{-1} = \begin{bmatrix} 2 & -3 & -1 \\ -1 & 2 & 1 \\ -2 & 4 & 1 \end{bmatrix}$	[1]
	$X = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} A^{-1} = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & -3 & -1 \\ -1 & 2 & 1 \\ -2 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \end{bmatrix}$	[1]
26.	$y = x\|x\| = \begin{cases} x^2, x \geq 0 \\ -x^2, x < 0 \end{cases}$	[1]
	Solving $y = x^2, x^2 + y^2 = 2$ simultaneously, $y + y^2 - 2 = 0 \Rightarrow (y+2)(y-1) = 0 \Rightarrow y = 1$ ($y = x^2$ lies in quadrant I). $\Rightarrow x = 1$	[1/2]
		[1]
	The required area = the shaded area = $\int_0^1 (\sqrt{2-x^2} - x^2)\,dx$	[2]
	$= \frac{1}{2}[x\sqrt{2-x^2} + 2\sin^{-1}\frac{x}{\sqrt{2}}]_0^1 - \frac{1}{3}[x^3]_0^1 = (\frac{1}{6} + \frac{\pi}{4})$ sq units.	[1+1/2]