Solution	Marks
REG-2324-MOCK-SET 11-MATH-EP(M2)	
Suggested solutions	
1. $f'(1) = \lim_{h \to 0} \dfrac{\ln(1+h)^4 - \ln 1}{h}$	1M
$= \lim_{h \to 0} \left[\dfrac{1}{h} \ln(1+h)^4 \right]$	
$= \lim_{h \to 0} \ln \left[(1+h)^{\frac{1}{h}} \right]^4$	1M
$= \ln e^4$	1M
$= 4$	1A
2. (a) $(1-2x)^n (2+3x)^2$	
$= \left[1 + C_1^n(-2x) + C_2^n(-2x)^2 + \ldots \right] (4 + 12x + 9x^2)$	1M
$= \left[1 - 2nx + 2n(n-1)x^2 + \ldots \right] (4 + 12x + 9x^2)$	
Consider the coefficient of x^2.	
$(1)(9) + (-2n)(12) + 2n(n-1)(4) = 49$	1M+1A
$8n^2 - 32n - 40 = 0$	
$n = 5$ or -1 (rejected)	1A
(b) $(1-2x)^2(2+3x)^2 = (1 - 10x + 40x^2 + \ldots)(4 + 12x + 9x^2)$.	
Required coefficient	
$= (1)(12) + (-10)(4)$	
$= -28$	1A

Solution	Marks
3. (a) $\dfrac{1-\cos 2\theta}{\sin 2\theta} = \dfrac{1-(1-2\sin^2\theta)}{2\sin\theta\cos\theta}$	1M
$= \dfrac{2\sin^2\theta}{2\sin\theta\cos\theta}$	
$= \dfrac{\sin\theta}{\cos\theta}$	
$= \tan\theta$	1
(b) $\sqrt{3}\cos 4x - \sqrt{3}\cos 4x\cos 8x = \sin 8x - \sin 8x\cos 4x$	
$\sqrt{3}\cos 4x(1-\cos 8x) = \sin 8x - \sin 8x\cos 4x$	
$\sqrt{3}\cos 4x\tan 4x\sin 8x = \sin 8x(1-\cos 4x)$	1M
$\sin 8x(\sqrt{3}\sin 4x - 1 + \cos 4x) = 0$	
$\sin 8x = 0$ or $\sqrt{3}\sin 4x - 1 + \cos 4x = 0$	1M
$8x = 5\pi$ or 6π or 7π; $\quad \sqrt{3} = \dfrac{1-\cos 4x}{\sin 4x}$	
$x = \dfrac{5\pi}{8}$ or $\dfrac{3\pi}{4}$ or $\dfrac{7\pi}{8}$; $\quad \tan 2x = \sqrt{3}$	
$2x = \dfrac{4\pi}{3}$	
$x = \dfrac{2\pi}{3}$	
Thus, $x = \dfrac{5\pi}{8}$ or $\dfrac{2\pi}{3}$ or $\dfrac{3\pi}{4}$ or $\dfrac{7\pi}{8}$.	1A+1A
4. (a) $\displaystyle\int (4+k\sqrt{t})^2\,\mathrm{d}t = \int (16+8k\sqrt{t}+k^2t)\,\mathrm{d}t$	1M
$= 16t + \dfrac{16kt^{\frac{3}{2}}}{3} + \dfrac{k^2t^2}{2} + \text{constant}$	1A
(b) We have Γ: $x = 4 \pm \sqrt{y}$.	1M
Volume $= \pi\displaystyle\int_0^{16}(4+\sqrt{y})^2\,\mathrm{d}y - \pi\int_0^{16}(4-\sqrt{y})^2\,\mathrm{d}y$	1M+1A
$= \pi\left[16y + \dfrac{16y^{\frac{3}{2}}}{3} + \dfrac{y^2}{2}\right]_0^{16} - \pi\left[16y - \dfrac{16y^{\frac{3}{2}}}{3} + \dfrac{y^2}{2}\right]_0^{16}$	1M
$= \dfrac{2048\pi}{3}$	1A

Solution	Marks
5. Let $(a,\ b)$ be the point of contact.	
$4x + y^2 = 16$	
$4 + 2y\dfrac{\mathrm{d}y}{\mathrm{d}x} = 0$	1M
$\dfrac{\mathrm{d}y}{\mathrm{d}x} = -\dfrac{2}{y}$	
The tangent passes through $(a,\ b)$ and $(6,\ 0)$.	
$\dfrac{b-0}{a-6} = -\dfrac{2}{b}$	1M
$b^2 = 12 - 2a$	
$(16 - 4a) = 12 - 2a$	1M
$a = 2$	
The points of contact are $\left(2,\ 2\sqrt{2}\right)$ and $\left(2,\ -2\sqrt{2}\right)$.	1A
The equation of the tangent to C at $\left(2,\ 2\sqrt{2}\right)$ is	
$\dfrac{y-2\sqrt{2}}{x-2} = -\dfrac{2}{2\sqrt{2}}$	1M
$x + \sqrt{2}y - 6 = 0$	1A
The equation of the tangent to C at $\left(2,\ -2\sqrt{2}\right)$ is	
$\dfrac{y+2\sqrt{2}}{x-2} = -\dfrac{2}{-2\sqrt{2}}$	
$x - \sqrt{2}y - 6 = 0$	1A

Solution	Marks
6. (a) $y = \int x \ln x^4 \, dx$	
$= 4\int x \ln x \, dx$	
$= 2x^2 \ln x - 2\int x \, dx$	1M
$= 2x^2 \ln x - x^2 + C$	1A
Γ passes through the point $P\left(e^2,\ 3e^4 + 7\right)$.	
$3e^4 + 7 = 2(e^2)^2 \ln e^2 - (e^2)^2 + C$	1M
$C = 7$	
Required equation is $y = 2x^2 \ln x - x^2 + 7$.	1A
(b) $f'(x) = 4x \ln x$	
$f''(x) = 4(\ln x + 1)$	1A
When $f''(x) = 0$, $x = \dfrac{1}{e}$.	

x	$0 < x < \dfrac{1}{e}$	$x > \dfrac{1}{e}$
$f''(x)$	$-$	$+$

1M

The point of inflexion of Γ is $\left(\dfrac{1}{e},\ -3e^{-2} + 7\right)$. 1A

Solution	Marks
7. (a) $\int \ln\left(x+\sqrt{x^2-1}\right) dx$	
$= x\ln\left(x+\sqrt{x^2-1}\right) - \int \frac{x}{x+\sqrt{x^2-1}}\left(1+\frac{1}{2}(x^2-1)^{-\frac{1}{2}}(2x)\right) dx$	1M+1M
$= x\ln\left(x+\sqrt{x^2-1}\right) - \int \frac{x(x^2-1)^{-\frac{1}{2}}(\sqrt{x^2-1}+x)}{x+\sqrt{x^2-1}} dx$	
$= x\ln\left(x+\sqrt{x^2-1}\right) - \int \frac{x}{\sqrt{x^2-1}} dx$	
Let $u = x^2 - 1$. Then $du = 2x\,dx$.	1M
$\int \ln\left(x+\sqrt{x^2-1}\right) dx$	
$= x\ln\left(x+\sqrt{x^2-1}\right) - \frac{1}{2}\int u^{-\frac{1}{2}} du$	
$= x\ln\left(x+\sqrt{x^2-1}\right) - u^{\frac{1}{2}} + \text{constant}$	
$= x\ln\left(x+\sqrt{x^2-1}\right) - \sqrt{x^2-1} + \text{constant}$	1A
(b) $\ln\left(x+\sqrt{x^2-1}\right) = 0$	
$x+\sqrt{x^2-1} = 1$	
$x^2 - 1 = (1-x)^2$	
$x = 1$	
Required area	
$= \int_1^{\frac{e+e^{-1}}{2}} \ln\left(x+\sqrt{x^2-1}\right) dx$	1M
$= \left[x\ln\left(x+\sqrt{x^2-1}\right) - \sqrt{x^2-1}\right]_1^{\frac{e+e^{-1}}{2}}$	1M
$= \frac{1}{e}$	1A

Solution	Marks
8. (a) When $n = 1$,	
L.H.S. $= \dfrac{1}{(2+2)(2+3)} + \dfrac{1}{(3+2)(3+3)} = \dfrac{1}{12}$	
R.H.S. $= \dfrac{1}{6(1+1)} = \dfrac{1}{12} =$ L.H.S.	
It is true for $n = 1$.	1
Assume $\displaystyle\sum_{k=2p}^{3p} \frac{1}{(k+2)(k+3)} = \frac{1}{6(p+1)}$, where $p \in \mathbb{Z}^+$.	1
$\displaystyle\sum_{k=2p+2}^{3p+3} \frac{1}{(k+2)(k+3)}$	
$= \displaystyle\sum_{k=2p}^{3p} \frac{1}{(k+2)(k+3)} - \frac{1}{(2p+2)(2p+3)} - \frac{1}{(2p+3)(2p+4)} + \frac{1}{(3p+3)(3p+4)}$	
$+ \dfrac{1}{(3p+4)(3p+5)} + \dfrac{1}{(3p+5)(3p+6)}$	1M
$= \dfrac{1}{6(p+1)} - \dfrac{1}{(2p+2)(2p+3)} - \dfrac{1}{(2p+3)(2p+4)} + \dfrac{1}{(3p+3)(3p+4)}$	
$+ \dfrac{1}{(3p+4)(3p+5)} + \dfrac{1}{(3p+5)(3p+6)}$	1M
$= \dfrac{1}{6(p+1)} - \left(\dfrac{1}{2p+2} - \dfrac{1}{2p+3}\right) - \left(\dfrac{1}{2p+3} - \dfrac{1}{2p+4}\right) + \left(\dfrac{1}{3p+3} - \dfrac{1}{3p+4}\right)$	
$+ \left(\dfrac{1}{3p+4} - \dfrac{1}{3p+5}\right) + \left(\dfrac{1}{3p+5} - \dfrac{1}{3p+6}\right)$	
$= \dfrac{1}{6(p+1)} - \dfrac{1}{2p+2} + \dfrac{1}{2p+4} + \dfrac{1}{3p+3} - \dfrac{1}{3p+6}$	
$= \dfrac{1}{p+1}\left(\dfrac{1}{6} - \dfrac{1}{2} + \dfrac{1}{3}\right) + \dfrac{1}{p+2}\left(\dfrac{1}{2} - \dfrac{1}{3}\right)$	
$= \dfrac{1}{6(p+2)}$	
It is true for $n = p + 1$.	
By M.I., it is true $\forall n \in \mathbb{Z}^+$.	1
(b) $\displaystyle\sum_{k=40}^{90} \frac{1}{(k+2)(k+3)}$	
$= \displaystyle\sum_{k=40}^{60} \frac{1}{(k+2)(k+3)} + \sum_{k=60}^{90} \frac{1}{(k+2)(k+3)} - \frac{1}{(62)(63)}$	
$= \dfrac{1}{6(20+1)} + \dfrac{1}{6(30+1)} - \dfrac{1}{3906}$	1M
$= \dfrac{17}{1302}$	1A

Solution	Marks
9. (a) $PQ = \sqrt{u^2+64} + \sqrt{(u-9)^2+16}$	1M
$\dfrac{\mathrm{d}PQ}{\mathrm{d}u} = \dfrac{u}{\sqrt{u^2+64}} + \dfrac{u-9}{\sqrt{(u-9)^2+16}}$	1M
$= \dfrac{u\sqrt{(u-9)^2+16}+(u-9)\sqrt{u^2+64}}{\sqrt{u^2+64}\sqrt{(u-9)^2+16}}$	
$= \dfrac{u^2[(u-9)^2+16]-(u-9)^2(u^2+64)}{\sqrt{u^2+64}\sqrt{(u-9)^2+16}(u\sqrt{(u-9)^2+16}-(u-9)\sqrt{u^2+64})}$	
$= \dfrac{-48(u-6)(u-18)}{\sqrt{u^2+64}\sqrt{(u-9)^2+16}(u\sqrt{(u-9)^2+16}-(u-9)\sqrt{u^2+64})}$	
For $\dfrac{\mathrm{d}PQ}{\mathrm{d}u} = 0$, we have $u = 6$.	1M
Thus, we have $a = 6$.	1A
(b) (i) Let A square units be the area of the rectangle $PQSR$.	
$A = uPQ$	1M
$\dfrac{\mathrm{d}A}{\mathrm{d}u} = PQ + u\dfrac{\mathrm{d}PQ}{\mathrm{d}u}$	1M
When $u = 6$,	
$\dfrac{\mathrm{d}A}{\mathrm{d}u} = \sqrt{6^2+64} + \sqrt{(6-9)^2+16} + 6(0)$	
$= 10 \neq 0$	1M
Hence, A does not attains its minimum value when $u = 6$.	
The claim is disagreed.	1A
(ii) $OP = \sqrt{u^2+(u^2+64)}$	
$= \sqrt{2u^2+64}$	
$\dfrac{\mathrm{d}OP}{\mathrm{d}t} = \dfrac{2u}{\sqrt{2u^2+64}}\dfrac{\mathrm{d}u}{\mathrm{d}t}$	1M
When $u = 6$,	
$12 = \dfrac{2(6)}{\sqrt{2(6)^2+64}}\left(\left.\dfrac{\mathrm{d}u}{\mathrm{d}t}\right\|_{u=6}\right)$	1M
$\left.\dfrac{\mathrm{d}u}{\mathrm{d}t}\right\|_{u=6} = 2\sqrt{34}$	
Let w units be the perimeter of the rectangle $PQSR$.	
$w = 2(u+PQ)$	
$\dfrac{\mathrm{d}w}{\mathrm{d}t} = 2\dfrac{\mathrm{d}u}{\mathrm{d}t} + 2\dfrac{\mathrm{d}PQ}{\mathrm{d}u}\cdot\dfrac{\mathrm{d}u}{\mathrm{d}t}$	1M
When $u = 6$,	
$\left.\dfrac{\mathrm{d}w}{\mathrm{d}t}\right\|_{u=6} = 2(2\sqrt{34}) + 2(0)(2\sqrt{34})$	
$= 4\sqrt{34}$	1A
Required rate is $4\sqrt{34}$ units per second.	

Solution	Marks
10. (a) (i) (1) $\begin{vmatrix}1 & a+2 & 1\\ 1 & -a & 6b-1\\ 2 & a+3 & 2b+1\end{vmatrix} = \begin{vmatrix}1 & -a\\ 2 & a+3\end{vmatrix} - (6b-1)\begin{vmatrix}1 & a+2\\ 2 & a+3\end{vmatrix} + (2b+1)\begin{vmatrix}1 & a+2\\ 1 & -a\end{vmatrix}$	1M
$= (3a+3) - (6b-1)(-a-1) + (2b+1)(-2a-2)$	
$= 2b(a+1)$	
Since (E) has unique solution, we have $2b(a+1) \neq 0$.	1M
Thus, $a \neq -1$ and $b \neq 0$.	1
(2) $x = \dfrac{\begin{vmatrix}2 & a+2 & 1\\ 1 & -a & 6b-1\\ 3 & a+3 & 2b+1\end{vmatrix}}{2b(a+1)}$	1M
$= \dfrac{-4b+1}{2b(a+1)}$	1A
$y = \dfrac{\begin{vmatrix}1 & 2 & 1\\ 1 & 1 & 6b-1\\ 2 & 3 & 2b+1\end{vmatrix}}{2b(a+1)}$	
$= \dfrac{4b-1}{2b(a+1)}$	
$z = \dfrac{\begin{vmatrix}1 & a+2 & 2\\ 1 & -a & 1\\ 2 & a+3 & 3\end{vmatrix}}{2b(a+1)}$	
$= \dfrac{a+1}{2b(a+1)}$	
$= \dfrac{1}{2b}$	1A
(ii) (1) The augmented matrix of (E) is	
$\left(\begin{array}{ccc\|c}1 & 1 & 1 & 2\\ 1 & 1 & 6b-1 & 1\\ 2 & 2 & 2b+1 & 3\end{array}\right) \sim \left(\begin{array}{ccc\|c}1 & 1 & 1 & 2\\ 0 & 0 & 6b-2 & -1\\ 0 & 0 & 2b-1 & -1\end{array}\right) \sim \left(\begin{array}{ccc\|c}1 & 1 & 1 & 2\\ 0 & 0 & 6b-2 & -1\\ 0 & 0 & -\frac{1}{3} & -\frac{2}{3}\end{array}\right)$	1M
We have $z = 2$.	
$(6b-2)(2) = -1$	
$b = \dfrac{1}{4}$	1A
(2) The augmented matrix of (E) is	
$\left(\begin{array}{ccc\|c}1 & 1 & 1 & 2\\ 0 & 0 & -\frac{1}{2} & -1\\ 0 & 0 & -\frac{1}{3} & -\frac{2}{3}\end{array}\right) \sim \left(\begin{array}{ccc\|c}1 & 1 & 1 & 2\\ 0 & 0 & 1 & 2\\ 0 & 0 & 0 & 0\end{array}\right)$	
The solution set is $\{(-t,\ t,\ 2) : t \in \mathbb{R}\}$.	1A
(b) When $a = -1$ and $b = \dfrac{1}{4}$, the system (F) is equivalent to (E).	

Solution	Marks
The solution set of (F) is $\{(-t,\ t,\ 2) : t \in \mathbb{R}\}$.	
$4(-t) + t^2 + 2 < -2$	1M
$t^2 - 4t + 4 < 0$	
$(t-2)^2 < 0$	1M
Note that $(t-2)^2 \geq 0$ for all real values of t.	
There is no real solutions of (F) satisfying $4x + y^2 + z < -2$.	1A

Solution	Marks
11. (a) $\displaystyle\int_0^1 xe^{ax}\,\mathrm{d}x = \left[\frac{xe^{ax}}{a}\right]_0^1 - \frac{1}{a}\int_0^1 e^{ax}\,\mathrm{d}x$	1M+1M
$\displaystyle = \frac{e^a}{a} - \left[\frac{e^{ax}}{a^2}\right]_0^1$	
$\displaystyle = \frac{ae^a - e^a + 1}{a^2}$	1
(b) Let $u = \ln(x+1)$. Then $\mathrm{d}u = \dfrac{1}{x+1}\,\mathrm{d}x$.	1M
$\displaystyle\int_0^{e-1} \frac{\ln(x+1)}{(1+x)^r}\,\mathrm{d}x = \int_0^1 \frac{u}{(e^u)^{r-1}}\,\mathrm{d}u$	1M
$\displaystyle = \int_0^1 ue^{(1-r)u}\,\mathrm{d}u$	
$\displaystyle = \frac{(1-r)e^{1-r} - e^{1-r} + 1}{(1-r)^2}$	1M
$\displaystyle = \frac{1 - re^{1-r}}{(1-r)^2}$	1A
(c) Let $v = (e-1)\tan x$. Then $\mathrm{d}v = (e-1)\sec^2 x\,\mathrm{d}x$.	1M
$\displaystyle\int_0^{\frac{\pi}{4}} \frac{\ln[1+(e-1)\tan x]}{(1+e\tan x - \tan x)^3}\,\mathrm{d}x + \int_0^{\frac{\pi}{4}} \frac{[\ln[1+(e-1)\tan x]]\tan^2 x}{(1+e\tan x - \tan x)^3}\,\mathrm{d}x$	
$\displaystyle = \int_0^{\frac{\pi}{4}} \frac{\ln[1+(e-1)\tan x]\sec^2 x}{[1+(e-1)\tan x]^3}\,\mathrm{d}x$	
$\displaystyle = \frac{1}{e-1}\int_0^{e-1} \frac{\ln(1+v)}{(1+v)^3}\,\mathrm{d}v$	
$\displaystyle = \frac{1}{e-1} \times \frac{1-3e^{1-3}}{(1-3)^2}$	1M
$\displaystyle = \frac{e^2-3}{4e^2(e-1)}$	1A
(d) Let $w = \dfrac{\pi}{2} - 2x$. Then $\mathrm{d}w = -2\,\mathrm{d}x$.	1M
$\displaystyle\int_{\frac{\pi}{8}}^{\frac{\pi}{4}} \frac{[\ln[1+(e-1)\cot 2x]]\csc^2 2x}{(1+e\cot 2x - \cot 2x)^3}\,\mathrm{d}x$	
$\displaystyle = -\frac{1}{2}\int_{\frac{\pi}{4}}^0 \frac{\ln\left[1+(e-1)\cot\left(\frac{\pi}{2}-w\right)\right]\csc^2\left(\frac{\pi}{2}-w\right)}{\left[1+e\cot\left(\frac{\pi}{2}-w\right) - \cot\left(\frac{\pi}{2}-w\right)\right]^3}\,\mathrm{d}w$	
$\displaystyle = \frac{1}{2}\int_0^{\frac{\pi}{4}} \frac{\ln[1+(e-1)\tan w]\sec^2 w}{(1+e\tan w - \tan w)^3}\,\mathrm{d}w$	
$\displaystyle = \frac{1}{2} \times \frac{e^2-3}{4e^2(e-1)}$	1M
$\displaystyle = \frac{e^2-3}{8e^2(e-1)}$	1A

Solution	Marks
12. (a) (i) Note that $AK \perp BC$, $BK \perp AC$ and $HA = HB = HC$.	
$(\overrightarrow{HK} - \overrightarrow{HA} - \overrightarrow{HB} - \overrightarrow{BC}) \cdot \overrightarrow{BC}$	
$= \overrightarrow{AK} \cdot \overrightarrow{BC} - (\overrightarrow{HB} + \overrightarrow{HC}) \cdot (\overrightarrow{HC} - \overrightarrow{HB})$	1M
$= 0 - (HC^2 - HB^2)$	1M
$= 0$	1
$(\overrightarrow{HK} - \overrightarrow{HA} - \overrightarrow{HB} - \overrightarrow{HC}) \cdot \overrightarrow{AC}$	
$= \overrightarrow{BK} \cdot \overrightarrow{AC} - (\overrightarrow{HA} + \overrightarrow{HC}) \cdot (\overrightarrow{HC} - \overrightarrow{HA})$	
$= 0 - (HC^2 - HA^2)$	
$= 0$	1
(ii) Using the result of (a)(i), we have $\overrightarrow{HK} - \overrightarrow{HA} - \overrightarrow{HB} - \overrightarrow{HC} = \mathbf{0}$.	1M
Thus, we have $\overrightarrow{HK} = \overrightarrow{HA} + \overrightarrow{HB} + \overrightarrow{HC}$.	1
(b) (i) We have $\overrightarrow{AB} = -4\mathbf{i}$ and $\overrightarrow{AC} = -2\sqrt{2}\mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$.	
$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ -4 & 0 & 0 \\ -2\sqrt{2} & -2 & -2 \end{vmatrix}$	
$= -8\mathbf{j} + 8\mathbf{k}$	
$S = \frac{1}{2}\left\|\overrightarrow{AB} \times \overrightarrow{AC}\right\|$	1M
$= \frac{1}{2}\sqrt{8^2 + 8^2}$	
$= 4\sqrt{2}$	1A
(ii) Let r be the radius of the circumcircle ABC.	
$r = \frac{abc}{4S}$	
$= \frac{\sqrt{32 - 16\sqrt{2}}(4)(4)}{4(4\sqrt{2})}$	1M
$= \sqrt{16 - 8\sqrt{2}}$	
Note that $AB = AC$. Denote the mid-point of BC by M.	
$\overrightarrow{MA} = \frac{1}{2}\overrightarrow{BA} + \frac{1}{2}\overrightarrow{CA}$	1M
$= (2 + \sqrt{2})\mathbf{i} + \mathbf{j} + \mathbf{k}$	
$\overrightarrow{HA} = \frac{r}{MA}\overrightarrow{MA}$	
$= \frac{\sqrt{16 - 8\sqrt{2}}}{\sqrt{8 + 4\sqrt{2}}}[(2 + \sqrt{2})\mathbf{i} + \mathbf{j} + \mathbf{k}]$	
$= \sqrt{\frac{8(2 - \sqrt{2})^2}{4(2 + \sqrt{2})(2 - \sqrt{2})}}[(2 + \sqrt{2})\mathbf{i} + \mathbf{j} + \mathbf{k}]$	
$= (2 - \sqrt{2})[(2 + \sqrt{2})\mathbf{i} + \mathbf{j} + \mathbf{k}]$	1A

Solution	Marks
(iii) $\overrightarrow{HK} = \overrightarrow{HA} + \overrightarrow{HB} + \overrightarrow{HC}$	
$= \overrightarrow{HA} + (\overrightarrow{HA} + \overrightarrow{AB}) + (\overrightarrow{HA} + \overrightarrow{AC})$	1M
$= (2 - 2\sqrt{2})\mathbf{i} + (4 - 3\sqrt{2})\mathbf{j} + (4 - 3\sqrt{2})\mathbf{k}$	1A

END OF PAPER