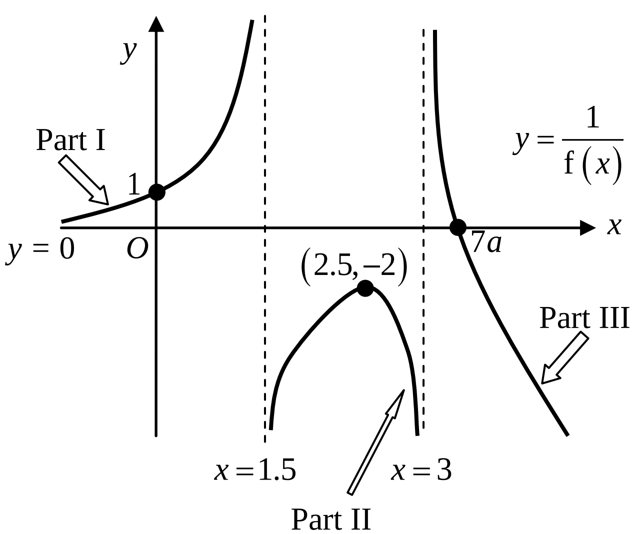
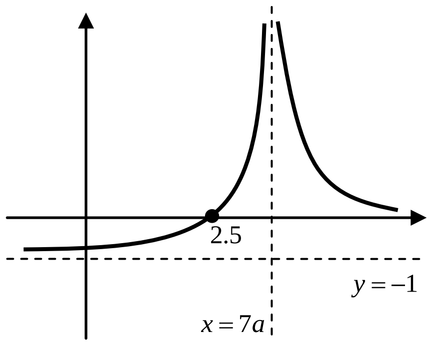
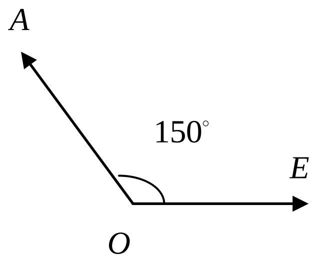
Qtn	Solutions
1(i)	Funds transferred into Account A: $0.05y+0.1z$ Funds transferred from Account A: $0.375x+0.125x=0.5x$ So we have $0.5x-(0.05y+0.1z)=16$ i.e. $0.5x-0.05y-0.1z=16$ ----(1)
(ii)	Similarly, for Account B, we have $-0.375x+0.1y-0.2z=-19$ ----(2) We also know $x+y+z=90$ ----(3) Solving (1), (2), (3) using GC, we have $x=40, y=20, z=30$
2	$(2+px)^{-q}$ $=2^{-q}\left(1+\frac{px}{2}\right)^{-q}$ $=2^{-q}\left(1+(-q)\left(\frac{px}{2}\right)+...\right)$ $=2^{-q}\left(1-\frac{pqx}{2}+...\right)$ $\approx \frac{1}{4}-x$ $\Rightarrow 2^{-q}=\frac{1}{4}$ ---(1) & $\frac{1}{4}\left(\frac{-2p}{2}\right)=-1$ ---(2) $q=2, p=4$
	$(2+4x)^{-2}$ $=\frac{1}{4}(1+2x)^{-2}$ $=\frac{1}{4}\left(1+(-2)(2x)+\frac{(-2)(-3)}{2!}(2x)^2+\frac{(-2)(-3)(-4)}{3!}(2x)^3+...\right)$ x^n coefficient $=\frac{1}{4}\left(\frac{(-2)(-3)(-4)...(-(n+1))}{n!}\right)(2)^n$ $=\frac{1}{4}(-1)^n(n+1)2^n=(-1)^n(n+1)2^{n-2}$
3(i)	Vol of water at end of Day 1

	$= 0.9(8500)$ Vol of water at end of Day 2 $= 0.9\left(500 + 0.9(8500)\right) = 0.9\left(500\right) + 0.9^2(8500)$ Vol of water at end of Day 3 $= 0.9(500) + 0.9^2(500) + 0.9^3(8500)$ = 7051.5 litres
(ii) (iii)	Vol of water at end of Day n, V $= 0.9(500) + 0.9^2(500) + ... + 0.9^{n-1}(500) + 0.9^n(8500)$ $= 500\left(0.9 + 0.9^2 + ... + 0.9^{n-1}\right) + 0.9^n(8500)$ $= 500\left[\dfrac{0.9\left(1-0.9^{n-1}\right)}{1-0.9}\right] + 0.9^n(8500)$ $= 4500\left[1-0.9^{n-1}\right] + 0.9^n(8500)$ For $V < 5000$, $4500\left[1-0.9^{n-1}\right] + 0.9^n(8500) < 5000$ From G.C, <table><tr><td>n</td><td>V</td></tr><tr><td>18</td><td>5025.3</td></tr><tr><td>19</td><td>4972.8</td></tr><tr><td>20</td><td>4925.5</td></tr></table>Least $n = 19$ Least number of days = 19. As $n \to \infty$, $V \to 4500$ Therefore, water tank will never dry up.
4i	

ii	
5	(i) Since l is the limit, As $n\to\infty,\quad u_n\to l,\ \ u_{n+1}\to l$ $\therefore \dfrac{l+a}{l+b}=\dfrac{a}{b}$ $\Rightarrow \mathrm{b}(l+a)=a(l+b)$ $\Rightarrow bl=al$ $\Rightarrow l(b-a)=0\quad (\because a\neq b)$ $\Rightarrow l=0$ (ii) $\dfrac{u_{n+1}+a}{u_n+b}=\dfrac{a}{b}$ $\Rightarrow b(u_{n+1}+a)=a(u_n+b)$ $\Rightarrow bu_{n+1}=au_n$ $\Rightarrow u_{n+1}=\dfrac{a}{b}u_n$ Hence $\{u_n\}$ is a GP with ratio $\dfrac{a}{b}$ and since $u_1=a$, $u_n=a\left(\dfrac{a}{b}\right)^{n-1}$

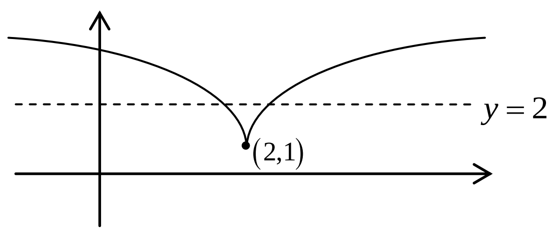
	(ii) Since S exists, $\lvert r\rvert<1\Rightarrow\left\lvert\frac{a}{b}\right\rvert<1$ $S=\dfrac{a}{1-\frac{a}{b}}$ $=\dfrac{ab}{b-a}$
6(i)	$\dfrac{du}{dx}=8x$ $\int x^3\sqrt{9+4x^2}\ dx=\int\frac{1}{8}x^2(8x)(9+4x^2)^{1/2}\ dx$ $=\frac{1}{8}\int\left(\frac{u-9}{4}\right)\left(\frac{du}{dx}\right)(u)^{1/2}\ dx$ $=\int\frac{1}{32}u^{3/2}-\frac{9}{32}u^{1/2}\ du$ $=\frac{1}{80}u^{5/2}-\frac{3}{16}u^{3/2}+C$ $=\frac{1}{80}(9+4x^2)^{5/2}-\frac{3}{16}(9+4x^2)^{3/2}+C$
(ii)	$\int_0^1 x^2\tan^{-1}x\ dx=\left[\left(\frac{1}{3}x^3\right)\tan^{-1}x\right]_0^1-\int_0^1\left(\frac{1}{3}x^3\right)\left(\frac{1}{1+x^2}\right)dx$ $=\left[\left(\frac{1}{3}x^3\right)\tan^{-1}x\right]_0^1-\frac{1}{3}\int_0^1\left(x-\frac{x}{1+x^2}\right)dx$ $=\left[\left(\frac{1}{3}x^3\right)\tan^{-1}x-\frac{1}{3}\left(\frac{1}{2}x^2-\frac{1}{2}\ln\left(1+x^2\right)\right)\right]_0^1$ $=\left(\frac{1}{3}\right)\left(\frac{\pi}{4}\right)-\frac{1}{3}\left(\frac{1}{2}-\frac{1}{2}\ln(2)\right)$ $=\frac{\pi}{12}-\frac{1}{6}(1-\ln 2)$

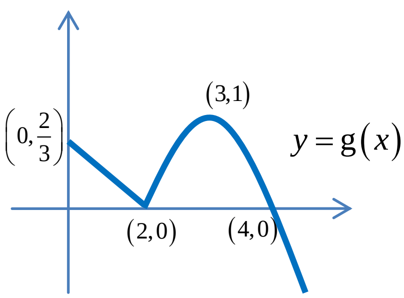
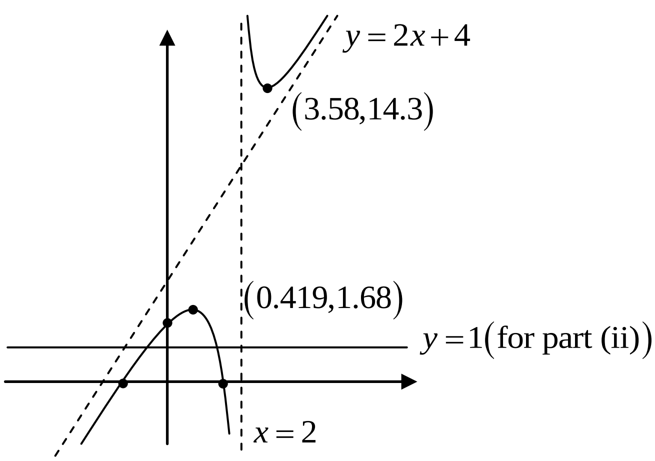
7(a)	AB line $\Rightarrow \underset{\sim}{r} = \begin{pmatrix} 2 \\ 0 \\ -1 \end{pmatrix} + \lambda \begin{pmatrix} -5 \\ 1 \\ 3 \end{pmatrix}, \lambda \in \mathbb{R}$ $\overrightarrow{OP} = \begin{pmatrix} 2-5\lambda \\ \lambda \\ -1+3\lambda \end{pmatrix}$ $\overrightarrow{OD} = \begin{pmatrix} a \\ 0 \\ 0 \end{pmatrix}$ C, P, D are collinear. $\overrightarrow{DP} = k\overrightarrow{CD}$ $\begin{pmatrix} 2-5\lambda-a \\ \lambda \\ -1+3\lambda \end{pmatrix} = k\begin{pmatrix} a-1 \\ 2 \\ 4 \end{pmatrix}$ $\Rightarrow \lambda = 1, k = \frac{1}{2}, a = -\frac{5}{3}$ $\overrightarrow{OD} = \begin{pmatrix} -\frac{5}{3} \\ 0 \\ 0 \end{pmatrix}$
(b)	$E(a,b,0)$ $\overrightarrow{OE} = \begin{pmatrix} a \\ b \\ 0 \end{pmatrix}$  $a^2 + b^2 = 1$ $\cos 150^\circ = \frac{\overrightarrow{OA} \bullet \overrightarrow{OE}}{\lvert\overrightarrow{OA}\rvert(1)}$ $-\frac{\sqrt{3}}{2} = \frac{\begin{pmatrix} 2 \\ 0 \\ -1 \end{pmatrix} \bullet \begin{pmatrix} a \\ b \\ 0 \end{pmatrix}}{\sqrt{5}}$ $-\frac{\sqrt{3}}{2} = \frac{2a}{\sqrt{5}} \Rightarrow a = -\frac{\sqrt{15}}{4}$ or -0.968 (3 s.f.)

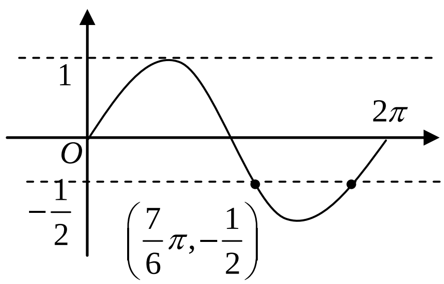
	$\dfrac{15}{16}+b^2=1 \Rightarrow b=\pm\dfrac{1}{4}$ $E\left(-\dfrac{\sqrt{15}}{4},\dfrac{1}{4},0\right)$ or $E\left(-\dfrac{\sqrt{15}}{4},-\dfrac{1}{4},0\right)$
8	(i) $\dfrac{2}{r(r+1)(r+3)} \equiv \dfrac{A}{r}+\dfrac{B}{r+1}+\dfrac{C}{r+3}$ $2 \equiv A(r+1)(r+3)+Br(r+3)+Cr(r+1)$ $r=0, \quad A=\dfrac{2}{3} \qquad r=-1, \quad B=-1 \qquad r=0, \quad C=\dfrac{1}{3}$ $\therefore \dfrac{2}{r(r+1)(r+3)} \equiv \dfrac{2}{3r}-\dfrac{1}{r+1}+\dfrac{1}{3(r+3)}$ $\dfrac{1}{4}\sum_{r=1}^{n}\dfrac{2}{r(r+1)(r+3)}=\dfrac{1}{4}\sum_{r=1}^{n}\left(\dfrac{2}{3r}-\dfrac{1}{r+1}+\dfrac{1}{3(r+3)}\right)$ $\begin{array}{llll} =\dfrac{1}{4}[& \dfrac{2}{3} & -\dfrac{1}{2} & +\cancel{\dfrac{1}{12}} \\ & +\dfrac{2}{6} & -\dfrac{1}{3} & +\cancel{\dfrac{1}{15}} \\ & +\dfrac{2}{9} & -\cancel{\dfrac{1}{4}} & +\cancel{\dfrac{1}{18}} \\ & +\cancel{\dfrac{2}{12}} & -\cancel{\dfrac{1}{5}} & +\cancel{\dfrac{1}{21}} \\ & +\cancel{\dfrac{2}{15}} & -\cancel{\dfrac{1}{6}} & +\cancel{\dfrac{1}{24}} \\ & & \vdots & \\ & +\cancel{\dfrac{2}{3(n-3)}} & -\cancel{\dfrac{1}{n-2}} & +\cancel{\dfrac{1}{3n}} \\ & +\cancel{\dfrac{2}{3(n-2)}} & -\cancel{\dfrac{1}{n-1}} & +\dfrac{1}{3(n+1)} \\ & +\cancel{\dfrac{2}{3(n-1)}} & -\cancel{\dfrac{1}{n}} & +\dfrac{1}{3(n+2)} \\ & +\cancel{\dfrac{2}{3n}} & -\dfrac{1}{n+1} & +\dfrac{1}{3(n+3)}] \end{array}$

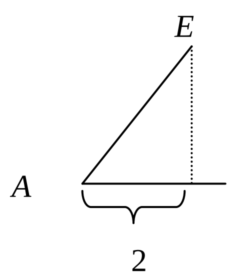
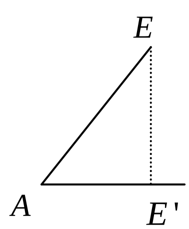
	$=\frac{1}{4}\left[\frac{7}{18}-\frac{1}{n+1}+\frac{1}{3(n+1)}+\frac{1}{3(n+2)}+\frac{1}{3(n+3)}\right]$ $=\frac{1}{12}\left[\frac{7}{6}-\frac{2}{n+1}+\frac{1}{n+2}+\frac{1}{n+3}\right]$ (iii) $\sum_{r=5}^{\infty}\frac{1}{2}\frac{1}{r(r-2)(r-3)}$ Replace r by $r+3$, $=\sum_{r=2}^{\infty}\frac{1}{2r(r+1)(r+3)}$ $=\sum_{r=1}^{\infty}\frac{1}{2r(r+1)(r+3)}-\frac{1}{2(1)(2)(4)}$ $=\lim_{n\to\infty}\left(\frac{1}{12}\left[\frac{7}{6}-\frac{2}{n+1}+\frac{1}{n+2}+\frac{1}{n+3}\right]\right)-\frac{1}{16}$ $=\frac{7}{72}-\frac{1}{16}$ $=\frac{5}{144}$
9	*(See alternative solution below)* Let $\text{P}(n)$ be the statement " 1+ (1+2) + (1+2+3) + (1+2+3+…+n) $=\frac{1}{6}n(n+1)(n+2)$ $,n\in\mathbb{Z}^+$ " When $n=1$, LHS of P(1) = 1, RHS of P(1) = $\frac{(1)(2)(3)}{6}=1$ Since LHS = RHS, P(1) is true. Assume P(k) is true for some $k\in\mathbb{Z}^+$, i.e. 1+ (1+2) + (1+2+3) + (1+2+3+…+k) $=\frac{1}{6}k(k+1)(k+2)$ To show P(k+1) is true, i.e. 1+ (1+2) + (1+2+3) + (1+2+3+…+k+k+1) $=\frac{1}{6}(k+1)(k+2)(k+3)$ LHS of P(k+1) =1+(1+2)+(1+2+3)+(1+2+3+…+k)+(1+2+3+…+k+k+1) $=\frac{1}{6}k(k+1)(k+2)+(1+2+3+\ldots+k+k+1)$

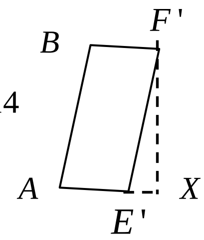
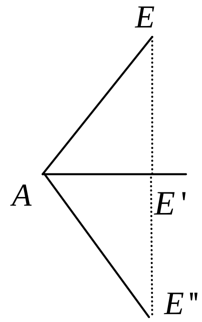
	$=\frac{1}{6}k(k+1)(k+2)+\frac{1}{2}(k+1)(k+2)$ $=\frac{1}{6}(k+1)(k+2)(k+3)$ = RHS of P(k+1) Since P(1) is true, and P(k) is true => P(k+1) is true, by mathematical induction, P(n) is true for $n \in \mathbb{Z}^+$. **Alternative Solution:** Let $\mathrm{P}(n)$ be the statement "$\sum_{r=1}^{n} U_r = \frac{1}{6}n(n+1)(n+2)$, where $U_r = 1+2+3+...+r$, $n \in Z^+$" When $n=1$, LHS of P(1) = $\sum_{r=1}^{1} U_r = U_1 = 1$, RHS of P(1) = $\frac{6}{6}=1$ Since LHS = RHS, P(1) is true. Assume P(k) is true for some $k \in \mathbb{Z}^+$, i.e. $\sum_{r=1}^{k} U_r = \frac{1}{6}k(k+1)(k+2)$ To show P(k+1) is true, i.e. $\sum_{r=1}^{k+1} U_r = \frac{1}{6}(k+1)(k+2)(k+3)$ LHS of P(k+1) $=\sum_{r=1}^{k+1} U_r$ $=\sum_{r=1}^{k} U_r + U_{k+1}$ $=\frac{1}{6}k(k+1)(k+2)+(1+2+3+\ldots+k+k+1)$ $=\frac{1}{6}k(k+1)(k+2)+\frac{1}{2}(k+1)(k+2)$ $=\frac{1}{6}k(k+1)(k+2)(k+3)$

	= RHS of P(k+1) Since P(1) is true, and P(k) is true => P(k+1) is true, by mathematical induction, P(n) is true for $n \in \mathbb{Z}^+$. (i) $3+(3+6)+(3+6+9)+...+(3+6+9+...+(6n-3))$ $=3[1+(1+2)+(1+2+3)+...+(1+2+3+...+(2n-1))]=3\left[\frac{1}{6}(2n-1)(2n)(2n+1)\right]$ $=n(2n-1)(2n+1)$ (ii) $3\times(3\times9)\times(3\times9\times27)\times...\times(3\times9\times27\times81\times...\times3^n)$ $=3\times(3^{1+2})\times(3^{1+2+3})\times...\times(3^{1+2+3+...+n})$ $=3^{1+(1+2)+(1+2+3)+...+(1+2+3+...+n)}$ $=3^{\frac{n(n+1)(n+2)}{6}}$
10 (i)	$\text{f}(x)=\sqrt{\lvert 2-x\rvert}+1,\ x\in\mathbb{R}$  The horizontal line $y=2$ cuts the curve at more than one point, hence f is not one-to-one and f^{-1} does not exist. <u>OR</u> $\text{f}(1)=\text{f}(3)=2$, hence f is not one-to-one and f^{-1} does not exist.
(ii)	The minimum value is $k=2$. Let $y=\text{f}(x)=\sqrt{\lvert 2-x\rvert}+1=\sqrt{x-2}+1(\because x\geq 2)$ $\Rightarrow x=2+(y-1)^2$ $D_{\text{f}^{-1}}=R_{\text{f}}=[1,\infty)$ $\quad\therefore \text{f}^{-1}(x)=2+(x-1)^2, x\geq 1$

(iii)	If there exists a solution for $f^{-1}(x) = f(x)$ $\Rightarrow$ there exists a solution for $f^{-1}(x) = x$ $\Rightarrow 2+(x-1)^2 = x$ $\Rightarrow x^2 - 3x + 3 = 0$ $\Rightarrow \left(x-\frac{3}{2}\right)^2 + \frac{3}{4} = 0$ $\Rightarrow$ no solution for x $\Rightarrow f^{-1}(x) = f(x)$ has no solution.
(iv)	 $[2,\infty) \xrightarrow{f} [1,\infty) \xrightarrow{g} (-\infty,1]$ $\therefore R_{gf} = (-\infty,1]$
(v)	$gf(x) = 1$ $f(x) = 3$ $\sqrt{x-2}+1 = 3$ $\sqrt{x-2} = 2$ $x-2 = 4$ $x = 6$
11	

	3 axial intercepts $\left(0,\frac{3}{2}\right),\left(\pm\sqrt{\frac{3}{2}},0\right)$ OR $(0,1.5),(\pm 1.22,0)$ 2 turning points $(0.419,1.68),(3.58,14.3)$ 2 asymptotes $x=2, y=2x+4$
(a)	Using the graph, the intersections of the curve with the line y = 1 are $(-0.5,1),(1,1)$, so the solution is $-\frac{1}{2}\le x\le 1$ or $x>2$ $\frac{2\sin^2 x-3}{\sin x-2}\ge 1$ So the solution is $-\frac{1}{2}\le \sin x\le 1$ or $\sin x>2(\text{rej})$  $\therefore 0\le x\le\frac{7}{6}\pi$ or $\frac{11}{6}\pi\le x\le 2\pi$
(b)	$y=\frac{2x^2-3}{x-2}=2x+4+\frac{5}{x-2}$ Translation of 2 units in the positive x-direction, followed by translation of 8 units in the positive y-direction.

12 (i)	$l_{EF}: \underset{\sim}{r} = \begin{pmatrix} 5 \\ -14 \\ 6 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix}, \lambda \in \mathbb{R}$ $l_{AE}: 3x = z + 15$ $\frac{x-0}{1} = \frac{z-(-15)}{3}, y = 0$ $l_{AE}: \underset{\sim}{r} = \begin{pmatrix} 0 \\ 0 \\ -15 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}, \mu \in \mathbb{R}$ $\lambda = 2$ $\overrightarrow{OE} = \begin{pmatrix} 5 \\ -14 \\ 6 \end{pmatrix} + 2 \begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix} = \begin{pmatrix} 7 \\ 0 \\ 6 \end{pmatrix}$
(ii)	$\underset{\sim}{n} = \begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix} \times \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix} = \begin{pmatrix} 21 \\ -3 \\ -7 \end{pmatrix}$ $\begin{pmatrix} 5 \\ 0 \\ 0 \end{pmatrix} . \begin{pmatrix} 21 \\ -3 \\ -7 \end{pmatrix} = 105$ $\underset{\sim}{r} . \begin{pmatrix} 21 \\ -3 \\ -7 \end{pmatrix} = 105$
(iii)	Method 1: By Observation, Projection vector of $\overrightarrow{AE}$ onto $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$  Method 2: Projection of of $\overrightarrow{AE}$ onto floor $\overrightarrow{AE'} = \left(\begin{pmatrix} 2 \\ 0 \\ 6 \end{pmatrix} . \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \right) \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$ 

	Method 1: $F'X = 7$ (Deduce from $\overrightarrow{OC}$) $Area = (AE')(F'X) = 2 \times 7 = 14$  Method 2: $Area = \left\lvert \overrightarrow{AB} \times \overrightarrow{AE'} \right\rvert = \left\lvert \begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix} \times \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix} \right\rvert = \left\lvert \begin{pmatrix} 0 \\ 0 \\ 14 \end{pmatrix} \right\rvert = 14$
(iv)	Let E'' be the reflection of E about and plane $OABC$. $\overrightarrow{OE} = \begin{pmatrix} 7 \\ 0 \\ 6 \end{pmatrix}, \overrightarrow{OE''} = \begin{pmatrix} 7 \\ 0 \\ -6 \end{pmatrix}$, $\overrightarrow{AE''} = \overrightarrow{OE''} - \overrightarrow{OA} = \begin{pmatrix} 2 \\ 0 \\ -6 \end{pmatrix}$  $l_3 : \underset{\sim}{r} = \begin{pmatrix} 5 \\ 0 \\ 0 \end{pmatrix} + \beta \begin{pmatrix} 1 \\ 0 \\ -3 \end{pmatrix}, \beta \in \mathbb{R}$
(v)	Let $\prod$ be plane $x + ay + bz = c$. EF is // $\prod$. $\begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix}$ is $\perp$ to $\underset{\sim}{n}_{\prod}$. $\begin{pmatrix} 1 \\ 7 \\ 0 \end{pmatrix} . \begin{pmatrix} 1 \\ a \\ b \end{pmatrix} = 0 \Rightarrow 1 + 7a = 0 \Rightarrow a = -\frac{1}{7}$ E is on plane $\prod$. $\begin{pmatrix} 7 \\ 0 \\ 6 \end{pmatrix} . \begin{pmatrix} 1 \\ a \\ b \end{pmatrix} = c \Rightarrow 7 + 6b = c.$

13 (a)	$x^3 - y^3 = 3x - 3y$ $\frac{\mathrm{d}}{\mathrm{d}x}\left(x^3 - y^3\right) = \frac{\mathrm{d}}{\mathrm{d}x}(3x - 3y)$ $3x^2 - 3y^2\frac{\mathrm{d}y}{\mathrm{d}x} = 3 - 3\frac{\mathrm{d}y}{\mathrm{d}x}$ $3x^2 - 3 = 3y^2\frac{\mathrm{d}y}{\mathrm{d}x} - 3\frac{\mathrm{d}y}{\mathrm{d}x}$ $\frac{x^2 - 1}{y^2 - 1} = \frac{\mathrm{d}y}{\mathrm{d}x}$ Substitute $x = -2$ and $y = 1$, $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{3}{0}$ (undefined) Therefore, the tangent is a vertical line. Thus, the tangent is $x = -2$.
(b)	Let the radius be r . We want to find $\frac{\mathrm{d}S}{\mathrm{d}t}$, $\frac{\mathrm{d}S}{\mathrm{d}t} = \frac{\mathrm{d}S}{\mathrm{d}r} \times \frac{\mathrm{d}V}{\mathrm{d}t} \div \frac{\mathrm{d}V}{\mathrm{d}r}$ $= (8\pi r) \times (0.1) \div \left(4\pi r^2\right)$ $= \frac{1}{5r}$ Sub $r = \frac{1}{2}$ into $\frac{\mathrm{d}S}{\mathrm{d}t}$, we get $\frac{2}{5}\mathrm{m}^2/\mathrm{s}$.
(c)	Let the side of each room be x . By cosine rule, $(4x)^2 = a^2 + b^2 - 2ab\cos\theta$ Total area, $A = \frac{1}{2}ab\sin\theta + 4x^2$ $A = \frac{1}{2}ab\sin\theta + \frac{1}{4}\left(a^2 + b^2 - 2ab\cos\theta\right)$ $= \frac{1}{2}ab\sin\theta + \frac{1}{4}a^2 + \frac{1}{4}b^2 - \frac{1}{2}ab\cos\theta$ To find max area, we let $\frac{\mathrm{d}A}{\mathrm{d}\theta} = 0$.

	$\frac{\mathrm{d}A}{\mathrm{d}\theta}=\frac{\mathrm{d}}{\mathrm{d}\theta}\left(\frac{1}{2}ab\sin\theta+\frac{1}{4}a^2+\frac{1}{4}b^2-\frac{1}{2}ab\cos\theta\right)$ $=\frac{1}{2}ab\cos\theta+\frac{1}{2}ab\sin\theta$ $\frac{1}{2}ab\cos\theta+\frac{1}{2}ab\sin\theta=0$ $\tan\theta=-1$ $\theta=\frac{3\pi}{4}\ \left(\text{since } 0<\theta<\pi\right)$ Therefore, stationary point at $\theta=\frac{3\pi}{4}$. $\frac{\mathrm{d}^2A}{\mathrm{d}\theta^2}=\frac{1}{2}ab\cos\theta-\frac{1}{2}ab\sin\theta$ $\left.\frac{\mathrm{d}^2A}{\mathrm{d}\theta^2}\right\|_{\theta=\frac{3\pi}{4}}<0$ Thus, the stationary point is maximum.