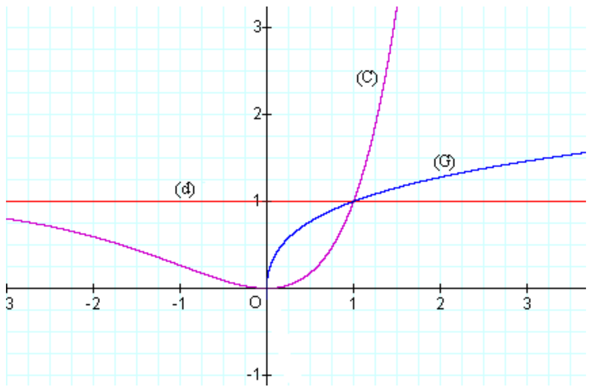
مشروع معيار التصحيح: رياضيات	الفرع: علوم الحياة	دورة 2008 العادية

Q I	Answer	Mark
1	$\|a\|=\|b\|=\|c\|=2$ so OA = OB= OC = 2.	0.5
2	$\frac{c-b}{a-b}=\frac{-\sqrt{3}+i}{-2i}=\frac{-1-i\sqrt{3}}{2}=e^{i\left(\pi+\frac{\pi}{3}\right)}=e^{-i\frac{2\pi}{3}}$.	1
3a	$\|Z\|=1$, iff BM = OM , so M moves on the perpendicular bisector (E) of [OB].	1
3b	AB = AO and CB = CO , so A and C are two points on (E).	0.5
3c	$Z=\frac{x+iy-\sqrt{3}-i}{x+iy}=\frac{x^2+y^2-\sqrt{3}x-y}{x^2+y^2}+\frac{-x+\sqrt{3}y}{x^2+y^2}i$ Z is pure imaginary iff $\begin{cases} x^2+y^2-\sqrt{3}x-y=0 \\ -x+\sqrt{3}y\neq 0 \end{cases}$ M moves on a circle excluding O and B. **Or**: arg (Z) $=\frac{\pi}{2}[\pi]=(\vec{u},\overrightarrow{BM})-(\vec{u},\overrightarrow{OM})=(\overrightarrow{OM},\overrightarrow{BM})[\pi]$. So M moves on the circle (F) with diameter [OB], excluding O and B.	1

Q II	Answer	Mark
1a	$P(A\cap C)=P(A)\times P(C/A)=0.65\times 0.55=0.3575$ $P(B\cap C)=P(B)\times P(C/B)=0.35\times 0.55=0.1925$ $P(C)=P(A\cap C)+P(B\cap C)=0.3575+0.1925=0.55$ **OR** given *P(C) = 0.55*.	1
1b	$P(B/C)=\frac{P(B\cap C)}{P(C)}=\frac{0.1925}{0.55}=0.35$.	0.5
2a	P(X=150 000)= O.65×0.55 +0.15×0.35=0.41. <table><tr><td>x_i</td><td>75000</td><td>100 000</td><td>150 000</td><td>200 000</td></tr><tr><td>p_i</td><td>0.35×0.3=0.105</td><td>0.35×0.55+0.65×0.3=0.3875</td><td>0.41</td><td>0.65×0.15 = 0.0975</td></tr></table>	1.5
2b	$E(X)=\sum p_i x_i=0.105\times 75000+0.3875\times 100000+0.41\times 150000+0.0975\times 200000=127\ 625$ The average amount paid by a voyager is 127 625 LL.	0.5
2c	An estimation of the sum received is: 127625×200 = 25 525 000 LL.	0.5

QIII	Answer	Mark
1	$\vec{N}=\overrightarrow{AB}\wedge\overrightarrow{AC}$ (4;-5;-3) is normal to (P) ; (P) : $\overrightarrow{AM}.\vec{N}=0$. Hence 4x – 5y – 3z + 6 = 0.	0.5
2	(DE): x = – 8t + 5 ; y =10t –3 ; z = 6t –3.	0.5
3	A director vector of (DE) and a normal vector of (P) have the same direction; Mid point (1; 2; 0) of [DE] belongs to (P).	1
4	$\overrightarrow{DE}$ (– 8 ; 10 ; 6) . $\overrightarrow{BC}$ (1 ; 2 ; –2) = 0 . ► **OR** since (DE) is perpendicular to plane (P).	0.5
5a	$\overrightarrow{DB}\wedge\overrightarrow{DC}$ (– 20 ; 0 ; –10), area = $\frac{1}{2}\sqrt{500}=\sqrt{125}=5\sqrt{5}$.	0.5
5b	Volume = $\frac{1}{6}\left\|\overrightarrow{DA}.(\overrightarrow{DB}\wedge\overrightarrow{DC})\right\|=\frac{50}{6}=\frac{25}{3}$. V= $\frac{base\times h}{3}$, $\frac{25}{3}=\frac{5\sqrt{5}\ h}{3}$, so h = $\sqrt{5}$.	1

Q IV	Answer	Mark
1a	$\lim\limits_{x\to-\infty} f(x) = \lim\limits_{x\to-\infty} (xe^x - e^x + 1) = 1$, so the line with equation $y = 1$ is asymptote to (C) .	0.5
1b	$f(x) - 1 = (x - 1)e^x$. □ (C) cuts (d) at point (1 ; 1) □ For $x > 1$, (C) is above (d) □ For $x < 1$, (C) is below (d).	0.5
1c	$\lim\limits_{x\to+\infty} f(x) = +\infty$ and $f(2) = 8.389$.	0.5
2	$f'(x) = e^x + (x-1)e^x = xe^x$. $\begin{array}{c\|ccccc} x & -\infty & & 0 & & +\infty \\ \hline f'(x) & & - & 0 & + & \\ \hline f(x) & 1 & \searrow & 0 & \nearrow & +\infty \end{array}$	1
3	$f''(x) = (x + 1)e^x$; $f''(x)$ vanishes for $x = -1$ and changes signs, thus (C) has a point of inflection $W(-1, 1 - \frac{2}{e})$.	0.5
4a		1.5
4b	$(m-1)e^{-x} = x - 1$ gives $m = (x-1)e^x + 1$. □ For $m < 0$; no solution □ For $m = 0$; one solution (double) □ For $0 < m < 1$; two solutions □ For $m \geq 1$; single solution.	1
5	$A = \int_0^1 [(x-1)e^x + 1]dx = \left[(x-2)e^x + x\right]_0^1 = (3-e)\,u^2$.	1
6a	f is continuous and strictly increasing on $[0 ; +\infty[$, thus f has an inverse function g. (G) is symmetric of (C) wrt the line of equation y=x.	1
6b	The area A' of the region bounded by (G), the axis of ordinates and the line (d) is equal (by symmetry) to the area A of the region bounded by (C), the axis of abscissas and the two lines $x = 0$ and $x = 1$, consequently $A' = A = (3 - e)u^2$.	0.5