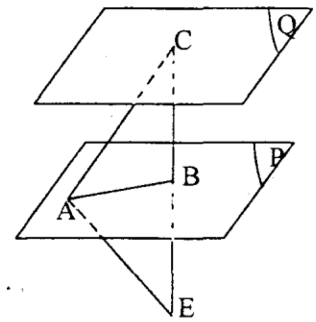
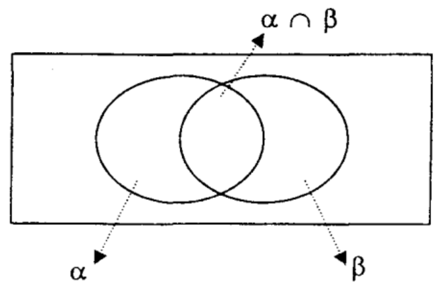
وزارة التربية والتعليم العالي
المديرية العامة للتربية
دائرة الامتحانات

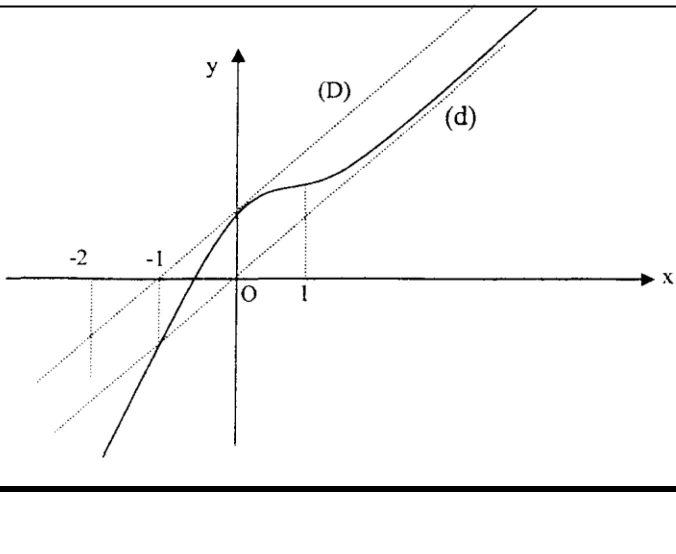
امتحانات شهادة الثانوية العامة
فرع علوم الحياة

دورة سنة 2002
الاستثنائية

عدد المسائل : اربعة

اسس التصحيح : الرياضيات

<table>
<tr><th colspan="2">Questions</th><th>Elements of solution</th><th>Note</th></tr>
<tr><td>I</td><td></td><td>(d) : $z = -2e^{-i\frac{\pi}{5}} = 2e^{i(\pi-\frac{\pi}{5})} = 2e^{i\frac{4\pi}{5}}$
(a) : M(z) et $\bar{z}-\frac{1}{z} = 0$ $z\bar{z} = 1$; $|z|^2 = \overline{OM}^2 = 1$; OM = 1
(a) : $z = 1 - e^{-i\frac{\pi}{3}}$; $\bar{z} = 1 - e^{i\frac{\pi}{3}} = \frac{1}{2} - i\frac{\sqrt{3}}{2} = e^{-i\frac{\pi}{3}}$</td><td>1 ½</td></tr>
<tr><td rowspan="5">II</td><td>1</td><td>A $\in$ (p) : 1 – 2 + 2 – 1 = 0 true ; B $\in$ (p) : 2 + 1 – 2 – 1 = 0 true</td><td>1</td></tr>
<tr><td>2</td><td>$\vec{n}_P$ (1, –1 , 2) ; $\overrightarrow{BC}$ (1 , –1 , 2) ; $\vec{n}_P = \overrightarrow{BC}$</td><td>½</td></tr>
<tr><td>3a</td><td>If M(x , y , z) is a point of (Q) then $\overrightarrow{CM} \cdot \vec{n}_P = 0$
1(x – 3) – (y + 2) + 2(z – 1) = 0 ; x – y + 2z – 7 = 0</td><td>1</td></tr>
<tr><td>3b</td><td>It is the distance from C to (P) = $\frac{|3+2+2-1|}{\sqrt{1+1+4}} = \sqrt{6}$
or CB = $\sqrt{1+1+4} = \sqrt{6}$</td><td>½</td></tr>
<tr><td>4</td><td>S is the area of triangle ACE
$S = \frac{AB\times CE}{2} = AB \times CB$
$= \sqrt{14} \times \sqrt{6}$
$= 2\sqrt{21}\ u^2$
Or S = 2 × area of triangle ABC
$S = \|\overrightarrow{AB}\wedge\overrightarrow{AC}\| = \|8\vec{i}-4\vec{j}+2\vec{k}\|$
$= \sqrt{8^2+4^2+2^2} = 2\sqrt{21}\ u^2$
</td><td>1</td></tr>
<tr><td rowspan="4">III</td><td>1</td><td>P (the watch has the defects α and β) = 0,04 × 0,1 = 0,004
</td><td>1</td></tr>
<tr><td>2</td><td>P(A) = P (has the defect α) – P (has the defects α and β)
= 0,04 – 0,004 = 0,036
P(B) = 0,01 –0,004 = 0,096
P(F) = 1 – (0,036 + 0,004 + 0,096) = 0,864</td><td>1 ½</td></tr>
<tr><td>3-a</td><td><table><tr><td>$X = x_i$</td><td>60 000</td><td>75 000</td><td>80 000</td><td>90 000</td></tr><tr><td>$P_i = P(X = x_i)$</td><td>0,004</td><td>0,096</td><td>0,036</td><td>0,864</td></tr></table></td><td>1 ½</td></tr>
<tr><td>3-b</td><td>E (X) = (60000 × 0,004) + (75000 × 0,096) +</td><td>1</td></tr>
</table>

		$(80000 \times 0{,}036) + (90000 \times 0{,}864) = 88080$ The average price of a sold watch is 88080 LL.	
IV	1-a	$\lim\limits_{x\to+\infty} f(x) = \lim\limits_{x\to+\infty}\left(x+\dfrac{x+1}{e^x}\right) = +\infty + 0 = +\infty$ $\lim\limits_{x\to+\infty} (f(x) - x) = \lim\limits_{x\to+\infty} \dfrac{x+1}{e^x} = 0$ alors $y = x$ is asymptote to (C)	1
	1-b	$f(x) = x$; $\dfrac{x+1}{e^x} = 0$; $x + 1 = 0$; $x = -1$ then E $(-1, -1)$	½
	1-c	$f(x) - x = (x + 1)\, e^{-x} > 0$ for $x > -1$	½
	2-a	$\lim\limits_{x\to-\infty} f(x) = \lim\limits_{x\to-\infty} (x + 1)\, e^{-x} = -\infty + \infty\,(-\infty) = -\infty$	½
	2-b	$f(-2) = -2 - e^{-2} = -9{,}3$	½
	3-a	The curve of f ' is above x'x therefore $f'(x) > 0$ for every real number x. And f is strictly increasing for every x.	1
	3-b	f is an antiderivative of f '. hence $A = f(1) - f(0) = 1 + 2e^{-1} - 1 = \dfrac{2}{e} = 0{,}735\ u^2$	1 ½
	4-a	Using (G) ; A(0,1) and $f'(0) = 1$ Hence (D) : $y = x + 1$ Or by calculating $f'(x)$, (D) : $y - f(0) = f'(0)(x - 0)$	1
	4-b	(G) admits a minimum for x = 1 therefore $f''(x) = 0$ for x = 1 with change of sign. (C) admits a point of inflection W$(1, 1, \dfrac{2}{e})$. Or $f'(x) = 1 - x\, e^{-x}$; $f''(x) = (x - 1)\, e^{-x}$ x: $-\infty$ … 1 … $+\infty$ f ''(x): − 0 + Then W$(1, 1 - \dfrac{2}{e})$ is a point of inflection..	1
	4-c		2