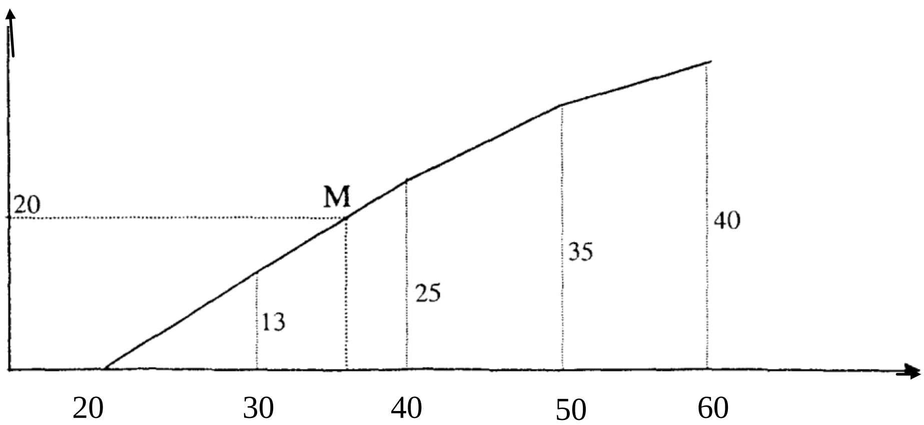
دورة سنة 2003 الاستثنائية	مسابقة في مادة الرياضيات اسس التصحيح	فرع علوم الحياة

<table>
<tr><th colspan="2">Questions</th><th>Answers</th><th>Marks</th></tr>
<tr><td rowspan="5">I -</td><td>1</td><td>$\overrightarrow{AM}.\left(\overrightarrow{AB} \wedge \overrightarrow{AC}\right) = 0$; $6x + 2y + 5z - 19 = 0$.

$6X_D + 2y_D + 5z_D - 19 = 6(1) + 2(-1) + 5(3) - 19 = 0$.</td><td>1</td></tr>
<tr><td>2</td><td>$x = \lambda$; $y = -3\lambda + 2$, $z = 3$</td><td>½</td></tr>
<tr><td>3(a)</td><td>$\overrightarrow{AB}$ $(-2; 1; 2)$ and $\overrightarrow{DC}$ $(-2; 1; 2)$ then $\overrightarrow{AB} = \overrightarrow{DC}$, ABCD is a parallelogram;
AB = BC = 3 , it is a rhombus.
▷ Or :
AB = BC = CD = DA = 3
▷ Or :
[AC] et [BD] have the same mid point and $\overrightarrow{AC}.\overrightarrow{BD} = 0$.</td><td>1</td></tr>
<tr><td>3(b)</td><td>The diagonals of the rhombus are perpendicular and they have the same mid point H :
Distance (A ; (d)) = AH = $\frac{1}{2}$ AC = $\frac{\sqrt{26}}{2}$.
▷ Or ; Distance (A ; (d)) = $\frac{\left\|\overrightarrow{AB} \wedge \overrightarrow{BD}\right\|}{\left\|\overrightarrow{BD}\right\|}$.</td><td>1</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="4">II-</td><td>1(a)</td><td>$\lvert z-5\rvert = \lvert z_M - z_B\rvert = BM$ $\lvert z-1\rvert = \lvert z_M - z_A\rvert = AM$ and $\lvert z'\rvert = OM'$</td><td>1</td></tr>
<tr><td>1(b)</td><td>OM' = 1 then MB = MA , the set of points M is the perpendicular bisector of [AB] .</td><td>1</td></tr>
<tr><td>2(a)</td><td>$x' + iy' = \frac{x-5+iy}{x-1+iy} = \frac{(x-5+iy)(x-1-iy)}{(x-1)^2+y^2} = \frac{x^2+y^2-6x+5+4iy}{(x-1)^2+y^2}$
$x' = \frac{x^2+y^2-6x+5}{(x-1)^2+y^2}$ et $y' = \frac{4y}{(x-1)^2+y^2}$</td><td>1</td></tr>
<tr><td>2(b)</td><td>z' is real so y' = 0 then y = 0 and M moves on the axes of abscissas.</td><td>½</td></tr>
<tr><td rowspan="2">III-</td><td>A(1)</td><td>The average age is equal to 36.75 years.</td><td>½</td></tr>
<tr><td>A(2-a)</td><td><table><tr><td>Age</td><td>[20 ; 30[</td><td>[30 ; 40[</td><td>[40 ; 50[</td><td>[50 ; 60]</td></tr><tr><td>I.C.F.</td><td>13</td><td>25</td><td>35</td><td>40</td></tr></table>

</td><td>1</td></tr>
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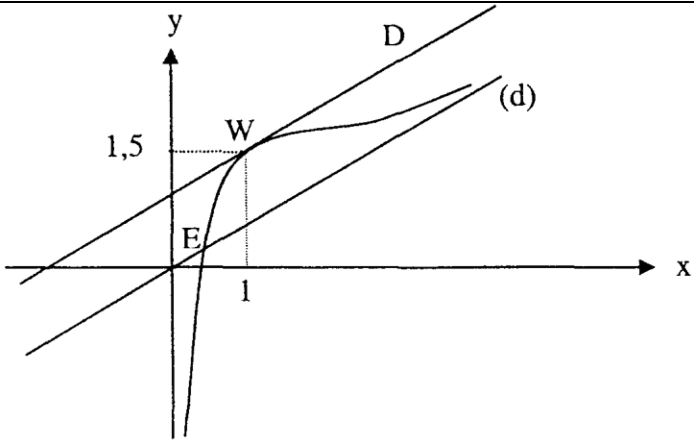
	A(2-b)	$\frac{x_M - 30}{40-30} = \frac{20-13}{25-13}$ $x_M = 35.8$ 35,8 is the median of this distribution or 50 % of the employees of this factory have an age less than or equal to (greater than or equal to) 35,8 years.	1
	B(1)	P(E) = $\frac{C_5^1 C_{10}^1 C_{25}^1}{C_{40}^3} = \frac{1250}{9880}$ = 0.126 and P(G) = $\frac{C_{15}^3}{C_{40}^3} = \frac{455}{9880}$ = 0.046	1
	B(2)	P(E/G) = $\frac{C_3^1 C_5^1 C_{25}^1}{C_{15}^3} = \frac{105}{455}$ = 0.23 and $P(E \cap G) = P(G) \times P(E/G) = 0.01$	1 ½
	1	$\lim_{x \to 0^+} f(x) = 0 + \frac{1-\infty}{0^+} = -\infty$.	½
	2(a)	$\lim_{x \to +\infty} f(x) = \lim_{x \to +\infty} \left(\frac{1}{2}x + \frac{1}{x} + \frac{\ln x}{x} \right) = +\infty$. $\lim_{x \to +\infty} \left(f(x) - \frac{1}{2}x \right) = \lim_{x \to +\infty} \left(\frac{1}{x} + \frac{\ln x}{x} \right) = 0$.	1
	2(b)	f(x) = $\frac{1}{2}$ x then 1 + lnx = 0 , So x = $\frac{1}{e}$ and E ($\frac{1}{e}$; $\frac{1}{2e}$) .	1
	3	$f'(x) = \frac{1}{2} + \frac{1 - 1 - \ln x}{x^2} = \frac{x^2 - 2\ln x}{2x^2}$.	½
	4(a)	$f'(x) = \frac{h(x)}{2x^2}$ with $h(x) \geq 1$ then $f'(x) > 0$ and f is strictly increasing.	½
	4(b)	Y = (x – 1) f '(1) + f(1) = $\frac{1}{2}$ x + 1 .	1
	5		2
	6	$A = \int_1^e \frac{1+\ln x}{x} dx = \left[\frac{(1+\ln x)}{2} \right]_1^e = \frac{3}{2} u^2$.	1 ½