CORRIGE QUESTION I Z = (1-i)12 (J3-3i) 121= 12 13+9 2 JA2 = 2 J3 $Z_{1} = JZ \left(\frac{JZ}{Z} - \lambda \frac{JZ}{Z} \right)$ $= JZ \quad \text{cuts} \quad \frac{-II}{4}$ $\frac{2}{2} = 2\sqrt{3} \quad \left(\begin{array}{c} \frac{1}{2} - \frac{1}{3} \\ = 2\sqrt{3} & \cos \frac{-\pi}{3} \end{array}\right)$ $\frac{12}{21} = (\sqrt{2})^{12} \text{ cis } -\frac{12\pi}{4}$ $= 2^6 cis - 3\pi$ $= 2^6 cis \pi$ Avissi, $2 = (2^6 \text{ is } 11) \cdot (2 \sqrt{3} \text{ is } -11 / 3)$ = $2^7 \sqrt{3}$ is $\frac{\epsilon}{3}$ = 128 53 (-1 +1 5) - 6453 + 1192 - J2 (i-1) = 0 $\frac{2^{5}}{2^{5}} = \frac{52}{2} \left(\frac{1}{2} - 1 \right) \left\{ \frac{7^{5}}{2^{5}} \right\}$ $\frac{2^{5}}{2^{5}} = \frac{2}{2} \left(\frac{1}{2^{5}} + \frac{1}{2^{5}} \right)$ $\frac{2^{5}}{2^{5}} = \frac{2}{2} \left(\frac{3\pi}{4} + \frac{2\pi}{5} \right)$ $\frac{2^{5}}{2^{5}} = \frac{5\sqrt{2}}{2^{5}} \left(\frac{3\pi}{2^{5}} + \frac{8\pi}{5^{5}} \right)$ $\frac{2^{5}}{2^{5}} = \frac{5\sqrt{2}}{2^{5}} \left(\frac{3\pi}{2^{5}} + \frac{8\pi}{2^{5}} \right)$ $\frac{2^{5}}{2^{5}} = \frac{5\sqrt{2}}{2^{5}} \left(\frac{3\pi}{2^{5}} + \frac{8\pi}{2^{5}} \right)$ 75 = 12 12 = 2 & e / 0, 1, 2, 3, 4} 20 = 5/2 cis 2, = 52 in $\frac{2}{2} = 5\sqrt{2}$ ch $\frac{19\pi}{20}$ $\frac{2}{2} = 5\sqrt{2}$ ch $\frac{27\pi}{20}$ 24 = 52 cm 3511 5 = 2 20, 21, 22, 23, 24

	$(i-2)^2 = (2-i)(2+i) + 2$ $(i-2)^2 = (4+4) + 2$ $(i-3)^2 = 5$ $2 = \frac{5}{-3+i} \frac{-3-i}{-3-i}$ $2 = \frac{-5(3+i)}{9+4}$	
(= (=		
4.	$P(2) = 2^{3} + 5i 2^{2} - 2(4+i) 2 + 2 - 4i$ Si $2 = 6i$ $(6 \in \mathbb{R})$ 2st we will a simple (along on a $P(6i) = 5$ $(6i)^{3} + 5i (6i)^{2} + (-8 - 2i)(6i) + 2 - 6$ $(5) - 6i - 56^{2}i - 86i + 26 + 2 - 4i$ (7) $26 + 2 = 5$ $3 + 2 + 2 = 5$ (1)	ene.)
	(1): $b = -1$ Vérificas (2): $-(-1)^3 - 5(-1)^2 - 8(-1) - 4 \stackrel{?}{=} 0$ Ainsi $2 = -1$ est le recire inceginaire pur	e clandé
1.	$B \cdot A = \begin{pmatrix} 1 & 0 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 1 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 2 & 0 \\ 1 & -3 \end{pmatrix} = \begin{pmatrix} 1 & -2 \\ -2 & 2 \\ 1 & -2 \end{pmatrix}$ $B \cdot A - A = \begin{pmatrix} 1 & -2 \\ -2 & 2 \\ 1 & -2 \end{pmatrix} - \begin{pmatrix} 0 & 1 \\ 2 & -2 \\ 1 & -3 \end{pmatrix} = \begin{pmatrix} 1 & -3 \\ -4 & 0 \\ 1 & -3 \end{pmatrix}$	

• det $A_1 = \begin{bmatrix} -2 & -1 & 1 & -2 & -1 \\ -3a & 1 & 3 & -3 & 1 \\ 2 & 1 & 1 & 2 \end{bmatrix}$ = $-2 - 3 = 6a - 1 + 12 = 3a$ = $-3a + 6a$ => $x = \frac{bak A_1}{bak A_1} = \frac{1}{a}$ = $-3a^2 - 6a + 2 + 3a^2 - 3a + 9$ = $-3a + 6$ => $y = \frac{bak A_1}{bak A_2} = \frac{1}{a}$ det $A_3 = \begin{bmatrix} 2 & -1 & -2 & a & -1 \\ -2a & 2 & 1 & a & 2 \\ a & 2 & 1 & a & 2 \\ a & 2 & 1 & a & 2 \end{bmatrix}$ = $a + 3a^2 - 8 + 2a + 6a^2 + 2$ = $3a^2 + 3a - 6a + 2 + 6a^2 + 2$	3.1	
a) Soit A la madrice du système. A singulière (=> clet A = 0) (=> 2 -1 1 =0 1 5 2 1 0 2 1 (=> 2 -3 + 4 - 0 - 6 + 2 = 0 (=> -3 + 4 - 0 - 6 + 2 = 0 (=> -3 + 4 - 0 - 6 + 2 = 0 (=> -3 + 6 - 0 - 1 + 12 - 3 a = -3 a + 6 => x = $\frac{1}{2}$ Aut $A_2 = \frac{1}{2}$ a = 1 + 1 + 2 - 3 a = -3 a + 6 => x = $\frac{1}{2}$ Aut $A_3 = \frac{1}{2}$ Aut $A_4 = \frac{1}{2}$ a = 1 + 1 + 2 - 3 a = -3 a + 6 => x = $\frac{1}{2}$ Aut $A_4 = \frac{1}{2}$ a = 1 + 3 a - 1 + 4 a - 2 - $\frac{1}{2}$ a = 1 + 3 a - 1 + 4 a - 2 - $\frac{1}{2}$ a = 1 + 3 a - 4 - $\frac{1}{2}$ a = 1 + 3 a - 4 a = 2 + 3 a - 4 a = 2 + 3 a - 4 a = 3 (3 a^2 + a - 2) = 3 \cdot 3 (a - 4) (a + 4)	2,	$ a \times -y + 2 = -2$ $ a \times +y + 3 = -3 a $ (a $\in \mathbb{R}$)
A singulation (a) what $A = 0$ (a) $A = 0$ (b) $A = A = 0$ (c) $A = A = 0$ (d) $A = A = 0$ (e) $A = A = 0$ (f) $A = A = 0$ (g) $A = A $		1 ax +2y +2 = 1
(a) $\frac{1}{2}$ $\frac{1}{3}$		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		(=> a -1 1 = 5 3 a -1
(a) $\frac{1}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{3}$ (d) $\frac{1}{3}$ (e) $\frac{1}{3}$ (f) $\frac{1}{3}$ (1021111111111
b) $\alpha \in \mathbb{R} \setminus \{\frac{2}{3}\}$ is system admet we solution with det $A_1 = \begin{bmatrix} -2 & -1 & 1 & 2 & -1 \\ -3\alpha & 1 & 3 & -3 & 1 \\ 1 & 2 & 1 & 1 & 2 \end{bmatrix}$ = $-2 - 3 - 6\alpha - 1 + 12 - 3\alpha$ = $-3\alpha + 6$ $\Rightarrow x = \frac{3\alpha + 4}{3}$ $\frac{3}{4}$		(=> - 9 a + 6 = 3
b) $\alpha \in \mathbb{R} \setminus \{\frac{2}{3}\} $ is system admet we solution and it det $A_1 = \begin{bmatrix} -2 & -1 & 1 & -2 & -1 \\ -3\alpha & 1 & 3 & -3 & 1 \\ 1 & 2 & 1 & 1 & 2 \end{bmatrix}$ b) $A \in \mathbb{R} \setminus \{\frac{2}{3}\} $ is system admet we solution and it det $A_1 = \begin{bmatrix} -2 & -3 & -4 & -2 & -2 \\ -3\alpha & 4 & -4 & -2 & -3 & -3 \\ -2\alpha & 4 & -2 & 4 & -2 & -3 \\ -3\alpha & 4 & 1 & -4 & -2 \\ -3\alpha & 4 & 1 & -4 & -2 & -3 \\ -3\alpha & 4 & -4 & -2 & -3 & -4 \\ -3\alpha & 4 & -4 & -2 & -4 & -2 \\ -3\alpha & 4 & -4 & -2 & -4 & -2 \\ -3\alpha & 4 & -4 & -2 & -4 & -4 \\ -3\alpha & 2 & 4 & -3\alpha & 2 & 4 \\ -3\alpha & 2 & 4 & -3\alpha & 2 & 4 \\ -3\alpha & 2 & 4 & -4 & -2 & -4 \\ -3\alpha & 3 & 4 & -4 & -2 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 & -4 \\ -3\alpha & 4 & 4 & -4 \\ -3\alpha & 4 & -$		
$dat A_{1} = \begin{vmatrix} -2 & -1 & 1 & -2 & -1 \\ -3a & 1 & 3 & -3a & 1 \\ 1 & 2 & 1 & 1 & 2 \end{vmatrix}$ $= -2 - 3 - 6a - 1 + 12 - 3a$ $= -3a + 6$ $\Rightarrow x = \frac{3a + 4a}{4a + 1} = 1$ $= -3a^{2} - 6a + 2 + 3a^{2} - 3a + 4$ $= -3a^{2} - 6a + 2 + 3a^{2} - 3a + 4$ $= -3a + 6$ $\Rightarrow y = \frac{3a + 6}{4a + 1} = 1$ $3a + 6$ $\Rightarrow y = \frac{3a + 6}{4a + 1} = 1$ $3a + 6 = 2 + 3a^{2} - 8 + 2a + 6a^{2} + 2$ $= 9a^{2} + 3a - 6$ $= 3(3a^{2} + a - 2) \qquad \begin{cases} p = 25 \\ 3a^{2} - 3a - 1 \end{cases}$ $= 3a + 3a^{2} - 8 + 2a + 6a^{2} + 2$ $= 3a^{2} + 3a - 6$ $= 3(3a^{2} + a - 2) \qquad \begin{cases} p = 25 \\ 3a^{2} - 3a - 1 \end{cases}$		1) 1 271
$= -2 - 3 - 6a - 1 + 12 - 3a$ $= -3a + 6$ $\Rightarrow \times = \frac{3a + 4a}{4a + 1}$ $a - 2 + \frac{3a}{4a} = -2$ $a - 1 + \frac{3a}{4a} = -2$ $a - 1 + \frac{3a}{4a} = -2$ $a - 1 + \frac{3a}{4a} = -3a$ $a $		1-2 -1 1 1 -2 -1
$= -3a + 6$ $\Rightarrow \times = \frac{3a + 6}{3a + 4}$ $\Rightarrow -2$ -2 3 2 $-3a$ 4 1 $= -3a^{2} - 6a + 2 + 3a^{2} - 3a + 4$ $= -9a + 6$ $\Rightarrow y = \frac{3a + 6}{3a + 4} = 1$ $4a + 4a = 2$ $4a + 3a^{2} - 8 + 2a + 6a^{2} + 2$ $= 3a^{2} + 3a - 6$ $= 3(3a^{2} + a - 2)$ $= 3 \cdot 3(a - \frac{2}{3})(a + 1)$ $= -2$ $4a + 2a + 6a^{2} + 2a$ $= -2$ $= 3 \cdot 3(a - \frac{2}{3})(a + 1)$ $= -25$ $= -3 \cdot 3(a - \frac{2}{3})(a + 1)$ $= -25$ $= -3 \cdot 3(a - \frac{2}{3})(a + 1)$		1 2 1 1 2
$\frac{1}{1} \frac{1}{1} \frac{1}$		= - 52 + 6
$det A_{2} = 2 -3a $		detA
$= 3 + 6$ $\Rightarrow y = \frac{3a + 6}{3a^{2} + 3a} = 1$ $\Rightarrow a + 3a^{2} - 8 + 2a + 6a^{2} + 2$ $= 3 + 3a - 6$ $= 3a + 3a + 6$ $= 3a + 3a + 6$ $= $		e det A2 = 2 -30 3 2 -3.
$\Rightarrow y = \frac{\det A_{2}}{\det A} = 1$ $\det A_{3} = \begin{vmatrix} \alpha & -1 & -2 \\ \alpha & -1 & -3\alpha \end{vmatrix} = 1$ $= \frac{\alpha}{3} + \frac{3\alpha^{2}}{3} - \frac{8}{3} + \frac{2\alpha}{3} + \frac{6\alpha^{2}}{3} + \frac{2}{3}$ $= \frac{3}{3} \left(\frac{3\alpha^{2}}{3} + \frac{\alpha}{3} - \frac{2}{3} \right) \left(\frac{\alpha}{3} + 1 \right)$ $= \frac{2}{3} \cdot 3 \left(\frac{\alpha}{3} - \frac{2}{3} \right) \left(\frac{\alpha}{3} + 1 \right)$ $= \frac{2}{3} \cdot 3 \left(\frac{\alpha}{3} - \frac{2}{3} \right) \left(\frac{\alpha}{3} + 1 \right)$		$= -3x^2 - 6x + 2 + 3x^2 - 3x + 4$
$\det A_3 = \begin{vmatrix} \alpha & -1 & -2 & \alpha & -1 \\ 2 & 1 & -3\alpha & 2 & 1 \\ \alpha & 2 & 1 & \alpha & 2 \end{vmatrix}$ $= \frac{\alpha}{3} + \frac{3\alpha^2}{3\alpha} - 8 + \frac{2\alpha}{3\alpha} + \frac{6\alpha^2}{3\alpha} + 2$ $= \frac{3\alpha^2}{3\alpha^2} + \frac{3\alpha}{3\alpha} - 2$ $= \frac{3(3\alpha^2 + \alpha - 2)}{3(\alpha + \alpha)} = \frac{2}{3} = \frac{2}{3} = \frac{2}{3}$ $= \frac{2}{3} \cdot 3(\alpha - \frac{2}{3})(\alpha + \alpha)$		$\Rightarrow y = \frac{\text{det } A_2}{\text{det } A_2} = 1$
$= \frac{\alpha + 3\alpha^{2} - 8 + 2\alpha + 6\alpha^{2} + 2}{= 3\alpha^{2} + 3\alpha - 6}$ $= \frac{3(3\alpha^{2} + \alpha - 2)}{= 3 \cdot 3(\alpha - \frac{2}{3})(\alpha + 1)} $ $= \frac{2}{3} = \frac{2}{3} $		10 -1 -21 0 -1
$= 3\alpha^{2} + 3\alpha - 6$ $= 3(3\alpha^{2} + \alpha - 2) \qquad \{ \rho = 25 \}$ $= 3 \cdot 3(\alpha - \frac{2}{3})(\alpha + 1) \qquad \{ \alpha_{1} = \frac{2}{3}, \alpha_{2} = -1 \}$		2 1 2 2
$=3\cdot3\left(\alpha-\frac{2}{3}\right)\left(\alpha+1\right)$ $=\frac{2}{3}$ $\alpha_{2}=-1$		$= \frac{\alpha + 3\alpha - 8 + 2\alpha + 6\alpha + 2}{= 3\alpha^2 + 3\alpha - 6}$
යිව් eco-logic		3 / 2 - 1

	S = 4	det A (1,1,-a- - système	(3a-2)(a+1) -9a+6	= -a-1 de 3 plans a.	Jant un
		-3 3 1 3 6 3			2 = -2
	2 0 0 2 2 33 ds.		$\begin{bmatrix} -6 \\ 4 \\ 9 \end{bmatrix}$ $\begin{bmatrix} 2 \\ 2 \\ 3 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 69 \\ 2 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 4 \\ 4 \\ 5 \end{bmatrix}$ $\begin{bmatrix} 4 \\ 4 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 4 \\ 4 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 4 \\ 4 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 4 \\ $	équivole tes	
	es ép du	système son	$\frac{-3}{2} = \frac{3}{2}$ $\frac{1}{2} = \frac{3}{2}$	plans distinctions dissigée per	to qui
eco-logic	Compa	$A\left(-\frac{3}{2}\right)$, 1, 5))		

QUESTION I 1. 4) 15 enf. de 3 aus → 2 · 15 = → 2 · 12 = 10 save 12 enf. do 10 ans Savent $P = \frac{13}{27} \simeq 0,7037$ b) $P = \frac{9}{15} \approx 0,4737$ c) $X \in \{0, 1, 2, 3\}$ 2 220 P(X=0) = -~ 0,0752 585 $P(X=1) = \frac{C_{12}^{2} \cdot C_{15}^{4}}{C_{15}^{3}} = \frac{99.5}{2525}$ $P(X=2) = \frac{C_{12}^{4} \cdot C_{15}^{2}}{C_{27}^{2}} = \frac{4260}{2525}$ 22 ~ 0,3385 $P(X = 3) = \frac{C_{n5}^{2}}{C_{29}^{2}}$ 455 2325 (TOTAL 2. TERMINAL: 8 lettres succesivenat 4 plaques A = 1680 4 · A = 4 · 210 = 840 mots 6) arranger 3 lettres diff, de R choisin une position pour B c) $C_5^2 \cdot C_3^2 \cdot P_4 = 10 \cdot 3 \cdot 24 = 720$ mots permutations des 4, lettres choisies voyelles consonnes