

SISTEMAS DE ECUACIONES LINEALES con 1 parámetro.

Discutir y resolver

$$1) \begin{cases} x + y = 3 \\ 2x - 3y = 1 \\ 3x + 2y = c \end{cases}$$

•c=8 SCD (2,1) •c≠8 SI

$$2) \begin{cases} x - 2y = 2 \\ x + y = 3 \\ x + cy = 4 \end{cases}$$

•c=4 SCD (8/3,1/3) •c≠4 SI

$$3) \begin{cases} x + 2y = 3 \\ 2x + y = c \end{cases}$$

•SCD (2c-3/3,6-c/3)

$$4) \begin{cases} x + 2y = 3 \\ ax + y + z = 0 \\ 2z + az = 0 \end{cases}$$

•a=1±√33/4 SI •a≠1±√33/4 SCD (-3a/2a²-a-4, 3a²-6/2a²-a-4, 6/2a²-a-4)

$$5) \begin{cases} y + at = 1 \\ y + z + t = 2 \\ x + y = 3 \end{cases}$$

•SCI x=2+at; y=1-at; z=1+(a-1)t

$$6) \begin{cases} x + y + kz = 2 \\ 3x + 4y + 2z = k \\ 2x + 3y - z = 1 \end{cases}$$

•k=3 SCI (5-10α, -3+7α, α)
•k≠3 SCD (6+3k, -4-2k, -1)

$$7) \begin{cases} x - 3z = -3 \\ 2x + ky - z = -2 \\ x + 2y + kz = 1 \end{cases}$$

•k=-5 SI •k=2 SCD (3α-3, 4-5α/2, α)
•k≠2; k≠-5 SCD (-3k-3/k+5; 4/k+5, 4/k+5)

$$8) \begin{cases} kx + y - z = 0 \\ x - 3y + z = 0 \\ 3x + 10y + 4z = 0 \end{cases}$$

•k=-10/11 SCI (22α, α, -19α) •k≠-10/11 SCD (0,0,0)

$$9) \begin{cases} 2x - ky + 4z = 0 \\ x + y + 7z = 0 \\ kx - y + 13z = 0 \end{cases}$$

•k≠3, k≠-12/7 SCD (0,0,0)
•k=3 SCI (-5α, -2α, α) •k=-12/7 SCI (28α, -35α, α)

$$10) \begin{cases} 2x + y + az = 4 \\ x + z = 2 \\ x + y + z = 2 \end{cases}$$

•a=2 SCI (2-z,0,z) •a≠2 SCD (2,0,0)

$$11) \begin{cases} x + y + z = a \\ x + (1+a)y + z = 2a \\ x + y + (1+a)z = 0 \end{cases}$$

•a=0 SCD (0,1,-1) •a≠0 SCI x=-y-z

$$12) \begin{cases} (a+1)x + y + z = a+1 \\ x + (a+1)y + z = a+3 \\ x + y + (a+1)z = -2a-4 \end{cases}$$

•a=0 SI •a=-3 SCI (3z+4/3, 2+3z/3, z)
•a≠0, a≠-3 SCD (a+1/a, a+3/a, -2a-4/a)

$$13) \begin{cases} x + ay + z = a + z \\ x + y + az = -2(a+1) \\ ax + y + z = a \end{cases}$$

•a=1 SI •a=-2 SCI (3z+4/3, 2+3z/3, z)
•a≠1, a≠-2 SCD (a/a-1, a+2/a-1, 2a+2/1-a)

$$14) \begin{cases} (2+a)x + y + z = 0 \\ x + ay + z = 0 \\ 2x + y - z = 0 \end{cases}$$

•a=(5+√33)/2 SCI (-(15+√33/2)z, (16+√33)z, z)
•a=(5-√33)/2 SCI (-(15-√33/2)z, (16-√33)z, z)
•a≠(5±√33)/2 SCD (0,0,0)

$$15) \begin{cases} x + 2y + kz = 1 \\ 2x + ky + 8z = 3 \end{cases}$$

•k=4 SI •k≠4 SCI ((k-6)/(k-4)-(k+4)z; 1/(k-4)+2z, z)

$$16) \begin{cases} 2y - z = k \\ 3x - 2z = 11 \\ y + z = 6 \\ 2x + y - 4z = k \end{cases}$$

•k=6 SCD (5,4,2) •k≠6 SI

$$17) \begin{cases} 2x + y - 4z = k + 1 \\ -x + 5y - z = k - 12 \\ x + 6y - 5z = k + 2 \\ 2x - 4y + 5z = k \end{cases}$$

•k=13 SCD (8,2,1) •k≠13 SI

$$18) \begin{cases} 2x + y + z + t = 0 \\ kx - 2y + 3z + 4t = 0 \\ 3x - y - z + 4t = 0 \\ -2x + 4y - z - 9t = 0 \end{cases}$$

•k=-1 SCI (-t, 8/5t, -3/5t, t) •k≠-1 SI

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$$19) \begin{cases} x + 2y = 3 \\ 3x + ay = c \end{cases}$$

- $a=6; c=9$ SCD $x=3-2y$ • $a=6; c \neq 9$ SI
- $a \neq 6$ SCD $((3a-2c)/(a-6), (c-9)/(a-6))$

$$20) \begin{cases} z + t = 2 \\ y + z = h \\ x + az = c \end{cases}$$

- SCI $x=c-2a+ao; y=-2+h+\alpha; z=2-\alpha; t=\alpha$

$$21) \begin{cases} 2x + y = a \\ 4x + 2y = 1 + b \\ 5x + 3y = 2 \end{cases}$$

- $1+b-2a=0$ SCD $(3a-2, 4-5a)$ • $1+b-2a \neq 0$ SI

$$22) \begin{cases} -x + 2y = a \\ 2x - 4y = b \\ -3x + 6y = 6 \end{cases}$$

- $a=2$ y $b=-4$ SCI $x=-2+2y$
- $a=2$ y $b \neq -4$ SI • $a \neq 2$ SI

$$23) \begin{cases} 3x - y + 2z = 1 \\ x + 4y + z = b \\ 2x - 5y + az = -2 \end{cases}$$

- $a=1$ y $b=3$ SCI $(b-8+9\alpha, \alpha, 8-13\alpha)$ • $a=1$ y $b \neq 3$ SI
- $a \neq 1$ SCD $((-ab+10b-4a-23)/(13-13a), (-3ab+4b+a-4)/(13-13a), b-3/a-1)$

$$24) \begin{cases} ax + y - z = b^2 \\ x + ay + z = b \\ x + y + 2az = 2 \end{cases}$$

- $a=0 \begin{cases} b=1 \text{ SCI } (2-\alpha, \alpha, -1+\alpha) \\ b=-2 \text{ SCI } (2-\alpha, \alpha, -4+\alpha) \\ b \neq 0, b \neq -1 \text{ SI} \end{cases}$
- $a=-1 \begin{cases} b=0 \text{ SCI } (1+\frac{\alpha}{2}, 1+\frac{3\alpha}{2}, \alpha) \\ b=-1 \text{ SCI } (\frac{1}{2}+\frac{\alpha}{2}, \frac{3+3\alpha}{2}, \alpha) \\ b \neq -2, b \neq -1 \text{ SI} \end{cases}$
- $a \neq 0; a \neq -1$ SCD $x = \frac{2a^2b^2 - 2ab + 2a - b^2 - b + 2}{2a(a^2 - 1)}$
 $y = \frac{2a^2b - 2ab^2 + b^2 + b - 2a - 2}{2a(a^2 - 1)}$
 $z = \frac{-b^2 - b + 2a + 2}{2a(a^2 - 1)}$

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$$25) \begin{cases} (1+a)x + y + z = 1 \\ x + (1+a)y + z = b \\ x + y + (1+a)z = b^2 \end{cases}$$

- $a=0$ y $b=1$ SCI $x=1-y-z$
- $a=0$ y $b \neq 1$ SI • $a=-3$ SI
- $a \neq 0; a \neq -3$ SCD $(\frac{-b^2-b+2+a}{a^2+3a}, \frac{ab+2b-b^2-1}{a^2+3a}, \frac{2b^2+ab^2-b-1}{a^2+3a})$

$$26) \begin{cases} x + ay + a^2z = 1 \\ x + ay + abz = a \\ bx + ay + a^2bz = a^2b^2 \end{cases}$$

- $a=0$ SI • $a=b \neq 1$ SI • $a=b=1$ SCD $x=1-y-z$
- $a \neq 0, \rightarrow b=1$ y $a=-1$ SCI $(\alpha, \alpha, 1)$
 $\rightarrow b=1$ y $a \neq -1$ SI
 $\rightarrow b=-1$ SCD $(\frac{-b^3a^2+a^3b^2+a^2b-ab-a^2+b}{(1-b)(b-a)}, \frac{b(a^2b-1)}{a(1-b)}, \frac{a-1}{a(b-a)})$

$$27) \begin{cases} 3x - 7y = a \\ x + y = b \\ 5x - 13y = 5a - 2b \\ x + 2y = a + b - 1 \end{cases}$$

- $b \neq 2a$ SI • $b=2a$ SCD $(3/2a, a/2)$

$$28) \begin{cases} x - y - 2z = 2 \\ 2x + y + 3z = 1 \\ 3x + z = 3 \\ x + 2y + 5z = a \\ 4x - y - z = b \end{cases}$$

- $a=-1$ y $b=5$ SCD $(3-z/3, -3-7z/3, z)$ • $a \neq -1$ y $b \neq 5$ SI

$$29) \begin{cases} x + y + z + t = 0 \\ x - y + z - t = 12 \\ x + y - z + t = -8 \\ x - y - z + at = c \end{cases}$$

- $a=-1$ y $c=4$ SCI $(2, -6-t, 4t)$ • $a=-1$ y $c \neq 4$ SI
- $a \neq -1$ SCD $(2, (-6a-c-2)/(a+1), 4, (c-4)/(a+1))$

$$30) \begin{cases} x + y + z + t = 0 \\ x - y + z - t = 12 \\ 3x + y + 3z + ht = k \\ x - y - z + t = c \end{cases}$$

- $h=1$ y $k=12$ SCI $((c/2)-t, -6-t, 6-(c/2)+t, t)$
- $h=1$ y $k \neq 12$ SI • $h \neq 1$ SCD

$$(\frac{c}{2} - \frac{k-12}{h-1}, -6 - \frac{k-12}{h-1}, \frac{k-12}{h-1} + 6 - \frac{c}{2}, \frac{k-12}{h-1})$$