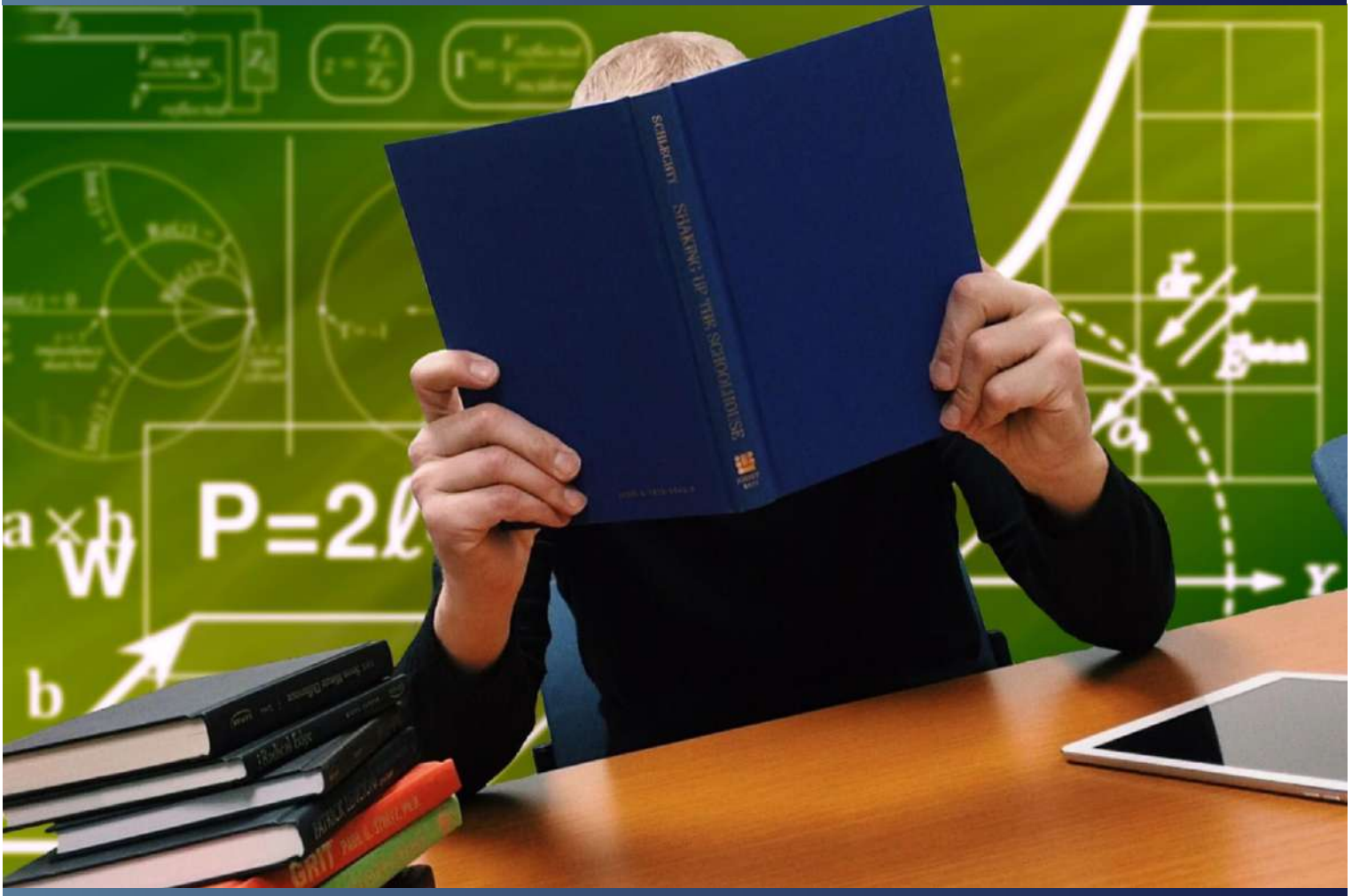
Ejercicios y Talleres



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EJERCICIO

Resolver por el método de igualación.

1. $\begin{cases} 7x - 4y = 5 \\ 9x + 8y = 13 \end{cases}$

2. $\begin{cases} 9x + 16y = 7 \\ 4y - 3x = 0 \end{cases}$

3. $\begin{cases} 14x - 11y = -29 \\ 13y - 8x = 30 \end{cases}$

4. $\begin{cases} 15x - 11y = -87 \\ -12x - 5y = -27 \end{cases}$

5. $\begin{cases} 7x + 9y = 42 \\ 12x + 10y = -4 \end{cases}$

6. $\begin{cases} 6x - 18y = -85 \\ 24x - 5y = -5 \end{cases}$

Resolver por sustitución.

$$\begin{cases} X + 11Y = 17 \\ 6X + 6Y = 42 \end{cases}$$

$$\begin{cases} X + 9Y = 22 \\ 3X - 6Y = 0 \end{cases}$$

$$\begin{cases} X - 2Y = -9 \\ 10X + 4Y = 78 \end{cases}$$

$$\begin{cases} X - 4Y = -19 \\ 8X - 11Y = -26 \end{cases}$$

$$\begin{cases} 4x+5y=5 \\ -10y-4x=-7 \end{cases}$$

$$\begin{cases} 32x-25y=13 \\ 16x+5y=1 \end{cases}$$

EJERCICIO:

Resolver por determinante:

1. Utiliza el método de determinantes para encontrar la solución.

(a) $\begin{cases} y=2x-4 \\ -2x=y-4 \end{cases}$

(b) $\begin{cases} y=2x+2 \\ -x=y+1 \end{cases}$

(c) $\begin{cases} x+y=5 \\ 3x+y=9 \end{cases}$

(d) $\begin{cases} x+y=5 \\ 3x+y=3 \end{cases}$

(e) $\begin{cases} y-4=2x \\ y=2x+2 \end{cases}$

(f) $\begin{cases} y+5=4x \\ y=4x+7 \end{cases}$

EJERCICIO:

Resolver por determinante:

1. $\begin{cases} x + y + z = 11 \\ x - y + 3z = 13 \\ 2x + 2y - z = 7 \end{cases}$

2. $\begin{cases} x + y + z = -6 \\ 2x + y - z = -1 \\ x - 2y - 3z = -6 \end{cases}$

3. $\begin{cases} 2x + 3y + 4z = 3 \\ 2x + 6y + 8z = 5 \\ 4x + 9y - 4z = 4 \end{cases}$

4. $\begin{cases} 4x - y + z = 4 \\ 2y - z + 2x = 2 \\ 6x + 3z - 2y = 12 \end{cases}$

5. $\begin{cases} x + 4y + 5z = 11 \\ 3x - 2y + z = 5 \\ 4x + y - 3z = -26 \end{cases}$

6. $\begin{cases} 7x + 10y + 4z = -2 \\ 5x - 2y + 6z = 38 \\ 3x + y - z = 21 \end{cases}$

1. Resolver por método de igualación

1. $\begin{cases} 7x - 4y = 5 \\ 8x + 8y = 13 \end{cases}$

$7x - 4y = 5$ $\qquad$ $8x + 8y = 13$

$7x = 5 + 4y$ $\qquad$ $8x = 13 - 8y$

$x = \frac{5+4y}{7}$ $\qquad$ $x = \frac{13-8y}{8}$

$$\frac{5+4y}{7} = \frac{13-8y}{8}$$

$$8(5+4y) = 7(13-8y)$$

$$40 + 32y = 91 - 56y$$

$$32y + 56y = 91 - 40$$

$$88y = 51$$

$$y = \frac{51}{88}$$

$x = \frac{5 + 4 \cdot \frac{51}{88}}{7}$ $\qquad$ $x = \frac{5 + \frac{204}{88}}{7}$ $\qquad$ $x = \frac{\frac{440+204}{88}}{7} = \frac{644}{7 * 88}$

$x = \frac{92}{88} = \frac{23}{22}$

Solución $\quad x = \frac{23}{22} \quad y = \frac{51}{88}$

2) $\begin{cases} 9x + 16y = 7 \\ 4y - 3x = 0 \end{cases}$

$9x + 16y = 7$
$9x = -16y + 7$

$x = \frac{7 - 16y}{9}$

$4y - 3x = 0$
$-3x = -4y$

$x = \frac{-4y}{-3}$

$\frac{7-16y}{9} = \frac{4}{3}y$ $\qquad$ $3(7 - 16y) = 4 \cdot 9y$ $\qquad$ $21 - 48y = 36y$

$21 = 48y + 36y$ $\qquad$ $21 = 84y$ $\qquad$ $y = \frac{21}{84}$ $\qquad$ $y = \frac{1}{4}$

$x = \frac{7 - 16 \cdot \frac{1}{4}}{9}$ $x = \frac{7-4}{9}$ $x = \frac{3}{9} = \frac{1}{3}$

Solucion $x = \frac{1}{3}$ $y = \frac{1}{4}$

3) $\begin{cases} 4x - 11y = -29 \\ 13y - 8x = 30 \end{cases}$

$4x - 11y = -29$ $13y - 8x = 30$

$4x = -29 + 11y$ $-8x = 30 - 13y$

$x = \frac{-29+11y}{4}$ $x = \frac{30-13y}{-8}$

$\frac{-29+11y}{4} = \frac{30-13y}{-8}$ $-8(-29+11y) = 4(30-13y)$

$232 - 88y = 120 - 52y$ $232 - 120 = 88y - 52y$

$112 = 36y$ $y = \frac{112}{36} = \frac{28}{9}$

$x = \frac{-29 + 11 \cdot \frac{28}{9}}{4}$ $x = \frac{-29 + \frac{308}{9}}{4}$ $x = \frac{\frac{-261+308}{9}}{4}$

$x = \frac{47}{36}$

4) $15x - 11y = -87$

$-12x - 5y = -27$

$15x - 11y = -87$ $-12x - 5y = -27$

$15x = -87 + 11y$ $-12x = -27 + 5y$

$x = \frac{-84+11y}{15}$ $x = \frac{-27+5y}{-12}$

$\frac{-87+11y}{15} = \frac{-27+5y}{-12}$ $-12(-87+11y) = 15(-27+5y)$

$1044 - 132y = -405 + 75y$ $1044 + 405 = 132y + 75y$

$1449 = 207y$ $y = \frac{1449}{207}$ $y = 7$

$x = \frac{-87+11\times 7}{15} = \frac{-87+77}{15} = \frac{-10}{15} = -\frac{2}{3}$

Solución $x = -\frac{2}{3}$ $y = 7$

5) $7x+9y=42$
$12x+10y=-4$

$7x=42-9y$ $\quad 12x=-4-10y$

$x=\frac{42-9y}{7}$ $\quad x=\frac{-4-10y}{12}$

$\frac{42-9y}{7}=\frac{-4-10y}{12}$ $\quad 12(42-9y)=7(-4-10y)$

$504-108y=-28-70y$

$504+28=108y-70y$ $\quad 532=38y$ $\quad y=14$

$x=\frac{42-9\cdot 14}{7}$ $\quad x=\frac{42-126}{7}$ $\quad x=\frac{-84}{7}=-12$

Solucion $x=-12$ $\quad y=14$

6) $6x-18y=-85$
$24x-5y=-5$

$6x=-85+18y$ $\quad 24x=-5+5y$

$x=\frac{-85+18y}{6}$ $\quad x=\frac{-5+5y}{24}$

$-\frac{85+18y}{6}=\frac{-5+5y}{24}$ $\quad 24(-85+18y)=6(-5+5y)$

$-2040+432y=-30+30y$ $\quad 432y-30y=2040-30$

$402y=2010$ $\quad y=\frac{2010}{402}=5$

$x=\frac{-85+18\cdot 5}{6}$ $\quad x=\frac{-85+90}{6}=\frac{5}{6}$

Solucion $x=\frac{5}{6}$ $\quad y=5$

Resolver por sustitución

1) $x+11y=17$
$6x+6y=42$

$x=17-11y$ $\quad 6(17-11y)+6y=42$

$102-66y+6y=42$

$102-42=66y-6y$

$60=60y$

$y=\frac{60}{60}$ $\quad y=1$

$x=17-11\cdot 1$ $\quad x=17-11$ $\quad x=6$

Solución $x=6$ $\quad y=1$

2) $x + 9y = 22$
$3x - 6y = 0$

$x = 22 - 9y$
$3(22-9y) - 6y = 0$
$66 - 27y - 6y = 0$
$66 - 33y = 0$
$66 = 33y$
$y = \frac{66}{33} = 2$

$x = 22 - 9(2)$
$x = 22 - 18$
$x = 4$

Solucion $x = 4$ $y = 2$

3) $x - 2y = -9$
$10x + 4y = 78$

$x = -9 + 2y$
$10(-9+2y) + 4y = 78$
$-90 + 20y + 4y = 78$
$-90 - 78 + 24y = 0$
$-168 = -24y$
$y = \frac{-168}{-24}$ $y = 7$

$x = -9 + 2 \cdot 7$
$x = -9 + 14$
$x = 5$

Solución $x = 5$ $y = 7$

4) $x - 4y = -19$
$8x - 11y = -28$

$x = -19 + 4y$
$8(-19+4y) - 11y = -28$
$-152 + 32y - 11y = -28$
$21y = 152 - 28$

$y = \frac{124}{21}$ $x = -19 + 4 \cdot \frac{124}{21}$ $x = -19 + \frac{496}{21}$

$x = \frac{-399 + 496}{21}$ $x = \frac{97}{21}$

Solucion $x = \frac{97}{21}$ $y = \frac{124}{21}$

5) $4x + 5y = 5$
$-10y - 4x = -7$

$4x = 5 - 5y$

$x = \frac{5-5y}{4}$

$-10y - 4\left(\frac{5-5y}{4}\right) = -7$

$-10y - 5 + 5y = -7$

$-5y = +5 - 7$

$y = \frac{-2}{-5}$ $y = \frac{2}{5}$ $x = \frac{5 - 5\cdot\frac{2}{5}}{4}$ $x = \frac{5 - \frac{10}{5}}{4}$

$x = \frac{25-10}{20} = \frac{15}{20}$ $x = \frac{3}{4}$

Solucion $x = \frac{3}{4}$ $y = \frac{2}{5}$

6) $32x - 25y = 13$
$16x + 5y = 1$

$32x = 13 + 25y$

$x = \frac{13+25y}{32}$

$16\left(\frac{13+25y}{32}\right) + 5y = 1$ $\frac{13+25y}{2} + 5y = 1$

$\frac{13+25y+10y}{2} = 1$ $13 + 35y = 2$ $35y = 2 - 13$

$35y = -10$ $y = -\frac{11}{35}$

$x = \frac{13 + 25\left(-\frac{11}{35}\right)}{32}$ $x = \frac{13 - \frac{275}{35}}{32}$ $x = \frac{\frac{455-275}{35}}{32}$

$x = \frac{180}{35\cdot 32} = \frac{45}{35\cdot 8} = \frac{9}{7\cdot 8} = \frac{9}{56}$

Solucion $x = \frac{9}{56}$ $y = -\frac{11}{35}$

Resolver por determinante

a) $y = 2x - 4$ $\quad -2x + y = -4$
$-2x = y - 4$ $\quad -2x + y = -4$ } Tiene infinitas soluciones.

b) $y = 2x + 2$ $\quad -2x + y = 2$
$-x = y + 1$ $\quad -x - y = 1$

$$x = \frac{\begin{vmatrix} 2 & 1 \\ 1 & -1 \end{vmatrix}}{\begin{vmatrix} -2 & 1 \\ -1 & -1 \end{vmatrix}} = \frac{-2-1}{2+1} = \frac{-3}{3} = -1$$

$$y = \frac{\begin{vmatrix} -2 & 2 \\ -1 & 1 \end{vmatrix}}{3} = \frac{-2+2}{3} = 0$$

Solucion $x = -1$ $y = 0$

c) $x + y = 5$
$3x + y = 9$

$$x = \frac{\begin{vmatrix} 5 & 1 \\ 9 & 1 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 3 & 1 \end{vmatrix}} = \frac{5-9}{1-3} = \frac{-4}{-2} = 2 \qquad y = \frac{\begin{vmatrix} 1 & 5 \\ 3 & 9 \end{vmatrix}}{-2} = \frac{9-15}{-2} = \frac{-6}{-2} = 3$$

Solucion $x = 2$ $y = 3$

d) $x + y = 5$
$3x + y = 3$

$$x = \frac{\begin{vmatrix} 5 & 1 \\ 3 & 1 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 3 & 1 \end{vmatrix}} = \frac{5-3}{1-3} = \frac{2}{-2} = -1 \qquad y = \frac{\begin{vmatrix} 1 & 5 \\ 3 & 3 \end{vmatrix}}{-2} = \frac{3-15}{-2} = \frac{-12}{-2} = 6$$

Solucion = $x = -1$ $y = 6$

e) $y - 4 = 2x$ $\quad -2x + y = 4$
$y = 2x + 2$ $\quad -2x + y = 2$

$$x = \frac{\begin{vmatrix} 4 & 1 \\ 2 & 1 \end{vmatrix}}{\begin{vmatrix} -2 & 1 \\ -2 & 1 \end{vmatrix}} = \frac{4-2}{-2+2} = \frac{2}{0} \Rightarrow \text{No tiene solución}$$

f) $y+5=4x$ $\quad y-4x=5$ $\quad -4x+y=5$

$y=4x+7$ $\quad y-4x=7$ $\quad -4x+y=7$

$$x=\frac{\begin{vmatrix}5 & -4\\ 7 & 4\end{vmatrix}}{\begin{vmatrix}-4 & 1\\ -4 & 1\end{vmatrix}}=\frac{20+28}{-4+4}=\frac{48}{0}$$ $\Rightarrow$ No tiene solución

Resolver por determinante

1) $x+y+z=11$

$x-y+3z=13$

$2x+2y-z=7$

$$x=\frac{\begin{vmatrix}11 & 1 & 1\\ 13 & -1 & 3\\ 7 & 2 & -1\end{vmatrix}}{\begin{vmatrix}1 & 1 & 1\\ 1 & -1 & 3\\ 2 & 2 & -1\end{vmatrix}}=\frac{11(1-6)-1(-13-21)+1(26+7)}{1(1-6)-1(-1-6)+1(2+2)}=\frac{12}{6}=2$$

$$y=\frac{\begin{vmatrix}1 & 11 & 1\\ 1 & 13 & 3\\ 2 & 7 & -1\end{vmatrix}}{\begin{vmatrix}1 & 1 & 1\\ 1 & -1 & 3\\ 2 & 2 & -1\end{vmatrix}}=\frac{1(-13-21)-11(-1-6)+1(7-26)}{6}=\frac{24}{6}=4$$

$$z=\frac{\begin{vmatrix}1 & 1 & 11\\ 1 & -1 & 13\\ 2 & 2 & 7\end{vmatrix}}{\begin{vmatrix}1 & 1 & 1\\ 1 & -1 & 3\\ 2 & 2 & -1\end{vmatrix}}=\frac{1(-7-26)-1(7-26)+11(2+2)}{6}=\frac{30}{6}=5$$

2) $x+y+z=6$

$2x+y-z=-1$

$x-2y-3z=-6$

$$x=\frac{\begin{vmatrix}6 & 1 & 1\\ -1 & 1 & -1\\ -6 & -2 & -3\end{vmatrix}}{\begin{vmatrix}1 & 1 & 1\\ 2 & 1 & -1\\ 1 & -2 & -3\end{vmatrix}}=\frac{6(-3-2)-1(3-6)+1(2+6)}{1(-3-2)-1(-6+1)+1(-4-1)}=\frac{-19}{-5}=\frac{19}{5}$$

$$y=\frac{\begin{vmatrix}1&6&1\\2&-1&-1\\1&-6&-3\end{vmatrix}}{\begin{vmatrix}1&1&1\\2&1&-1\\1&-2&-3\end{vmatrix}}=\frac{1(3-6)-6(-6+1)+1(-12+1)}{-5}=\frac{16}{-5}=-\frac{16}{5}$$

$$z=\frac{\begin{vmatrix}1&1&6\\2&1&-1\\1&-2&-6\end{vmatrix}}{\begin{vmatrix}1&1&1\\2&1&-1\\1&-2&-3\end{vmatrix}}=\frac{1(-6-2)-1(-12+1)+6(-4-1)}{-5}=\frac{-27}{-5}=\frac{27}{5}$$

Solución $x=\frac{19}{5}$ $y=-\frac{16}{5}$ $z=\frac{27}{5}$

3) $2x+3y+4z=3$
$2x+6y+8z=5$
$4x+9y-4z=4$

$$x=\frac{\begin{vmatrix}3&3&4\\5&6&8\\4&9&-4\end{vmatrix}}{\begin{vmatrix}2&3&4\\2&6&8\\4&9&-4\end{vmatrix}}=\frac{3(-24-72)-3(-20-32)+4(45-24)}{2(-24-72)-3(-8-32)+4(18-24)}=\frac{-48}{-96}=\frac{1}{2}$$

$$y=\frac{\begin{vmatrix}2&3&4\\2&5&8\\4&4&-4\end{vmatrix}}{\begin{vmatrix}2&3&4\\2&6&8\\4&9&-4\end{vmatrix}}=\frac{2(-20-32)-3(-8-32)+4(8-20)}{-96}=\frac{-32}{-96}=\frac{1}{3}$$

$$z=\frac{\begin{vmatrix}2&3&3\\2&6&5\\4&9&4\end{vmatrix}}{\begin{vmatrix}2&3&4\\2&6&8\\4&9&-4\end{vmatrix}}=\frac{2(24-45)-3(8-20)+3(18-24)}{-96}=\frac{-24}{-96}=\frac{1}{4}$$

Solución $x=\frac{1}{2}$ $y=\frac{1}{3}$ $z=\frac{1}{4}$

4) $4x-y+z=4$
$2y-z+2x=2$
$6x+3z-2y=12$

$4x-y+z=4$
$2x+2y-z=2$
$6x-2y+3z=12$

$$x=\frac{\begin{vmatrix}4&-1&1\\2&2&-1\\12&-2&3\end{vmatrix}}{\begin{vmatrix}4&-1&1\\2&2&-1\\6&-2&3\end{vmatrix}}=\frac{4(6-2)-(-1)(6+12)+1(-4-24)}{4(6-2)-(-1)(6+6)+1(-4-12)}=\frac{6}{12}=\frac{1}{2}$$

$$y=\frac{\begin{vmatrix}4&4&1\\2&2&2\\6&12&-2\end{vmatrix}}{\begin{vmatrix}4&-1&1\\2&2&-1\\6&-2&3\end{vmatrix}}=\frac{4(-4-24)-4(-4-12)+1(24-12)}{12}=\frac{36}{12}=3$$

$$z=\frac{\begin{vmatrix}4&-1&4\\2&2&2\\6&-2&12\end{vmatrix}}{\begin{vmatrix}4&-1&1\\2&2&-1\\6&-2&3\end{vmatrix}}=\frac{4(24+4)-(-1)(24-12)+4(-4-12)}{12}=\frac{60}{12}=5$$

Solución $x=\frac{1}{2}$ $y=3$ $z=5$

5) $x+4y+5z=11$
$3x-2y+z=5$
$4x+y-3z=-26$

$$x=\frac{\begin{vmatrix}11&4&5\\5&-2&1\\-26&1&-3\end{vmatrix}}{\begin{vmatrix}1&4&5\\3&-2&1\\4&1&-3\end{vmatrix}}=\frac{11(6-1)-4(-15+26)+5(5-52)}{1(6-1)-4(-9-4)+5(3+8)}=\frac{-224}{112}=-2$$

$$y=\frac{\begin{vmatrix}1&11&5\\3&5&1\\4&-26&-3\end{vmatrix}}{\begin{vmatrix}1&4&5\\3&-2&1\\4&1&-3\end{vmatrix}}=\frac{1(-15+26)-11(-9-4)+5(-78-20)}{112}=\frac{-336}{112}=-3$$

$$z=\frac{\begin{vmatrix}1&4&11\\3&-2&5\\4&1&-26\end{vmatrix}}{\begin{vmatrix}1&4&5\\3&-2&1\\4&1&-3\end{vmatrix}}=\frac{1(52-5)-4(-78-20)+11(3+8)}{112}=\frac{560}{112}=5$$

Solucion $x=-2$ $y=-3$ $z=5$

6) $7x+10y+4z=-2$
$5x-2y+6z=38$
$3x+y-z=21$

$$x=\frac{\begin{vmatrix}-2 & 10 & 4\\ 38 & -2 & 6\\ 21 & 1 & -1\end{vmatrix}}{\begin{vmatrix}7 & 10 & 4\\ 5 & -2 & 6\\ 3 & 1 & -1\end{vmatrix}}=\frac{-2(2-6)-10(-38-126)+4(38+42)}{7(2-6)-10(-5-18)+4(5+6)}=\frac{1968}{246}=8$$

$$y=\frac{\begin{vmatrix}7 & -2 & 4\\ 5 & 38 & 6\\ 3 & 21 & -1\end{vmatrix}}{\begin{vmatrix}7 & 10 & 4\\ 5 & -2 & 6\\ 3 & 1 & -1\end{vmatrix}}=\frac{7(-38-126)-(-2)(-5-18)+4(105-114)}{246}=\frac{-1230}{246}=-5$$

$$z=\frac{\begin{vmatrix}7 & 10 & -2\\ 5 & -2 & 38\\ 3 & 1 & 21\end{vmatrix}}{\begin{vmatrix}7 & 10 & 4\\ 5 & -2 & 6\\ 3 & 1 & -1\end{vmatrix}}=\frac{7(-42-38)-10(105-114)+(-2)(5+6)}{246}=\frac{-492}{246}=-2$$

Solucion $x=8$ $y=-5$ $z=-2$