

Corrección Examen 3º Evaluación 2º Bachillerato - 11-05-2018
Matemáticas (C.S.S.2)

1. Dependencias

x = alumnos del 1º curso
 y = " " 2º curso
 z = " " 3º curso

Matriz Asociada

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & -2 \\ 2 & 1 & -5 \end{pmatrix}$$

Matriz Ampliada

$$A^* = \begin{pmatrix} 1 & 1 & 1 & 350 \\ 1 & -1 & -2 & 0 \\ 2 & 1 & -5 & 250 \end{pmatrix}$$

$$\begin{cases} x + y + z = 350 \\ x = y + 2z \\ y + 2x = 52 + 250 \end{cases}$$

$$\begin{cases} x + y + z = 350 \\ x - y - 2z = 0 \\ 2x + y - 5z = 250 \end{cases}$$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 1 & -1 & -2 \\ 2 & 1 & -5 \end{vmatrix} = (5 + 1 - 4) - (-2 - 2 - 5) = 2 + 9 = 11 \neq 0$$

$\text{rang } A = \text{rang } A^* = 3 \rightarrow$ Sistema compatible Determinado

$$x = \frac{\begin{vmatrix} 350 & 1 & 1 \\ 0 & -1 & -2 \\ 250 & 1 & -5 \end{vmatrix}}{11} = \frac{2200}{11} = \boxed{200}$$

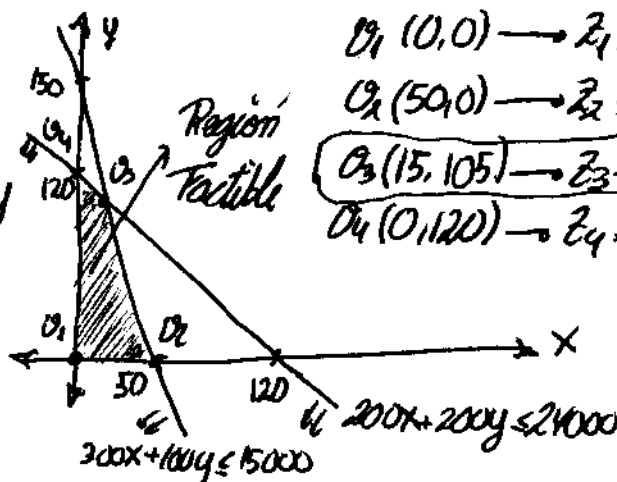
$$y = \frac{\begin{vmatrix} 1 & 350 & 1 \\ 0 & 0 & -2 \\ 2 & 250 & -5 \end{vmatrix}}{11} = \frac{1100}{11} = \boxed{100}$$

$$z = \frac{\begin{vmatrix} 1 & 1 & 350 \\ 1 & -1 & 0 \\ 2 & 1 & 250 \end{vmatrix}}{11} = \frac{550}{11} = \boxed{50}$$

2. Dependencias

x = preparado A
 y = " " B
 $\max f(x,y) = z = 600x + 400y$

$$\text{s.a.} \begin{cases} 200x + 200y \leq 24000 \\ 300x + 100y \leq 15000 \\ x, y \geq 0 \end{cases}$$



$O_1(0,0) \rightarrow z_1 = 0$

$O_2(50,0) \rightarrow z_2 = 30.000$

$O_3(15,105) \rightarrow z_3 = 51.000$

$O_4(0,120) \rightarrow z_4 = 48.000$

Hay que preparar 15 raciones del preparado A y 105 del preparado B, para obtener un rendimiento energético máximo de 51.000 calorías.

3- leyenda

$x =$ € aportados por el 1º hermano
 $y =$ " " " " 2º " "
 $z =$ " " " " 3º " "

M. Asociada

M. Ampliada

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & -2 \\ 3 & -2 & 0 \end{pmatrix}$$

$$A^* = \begin{pmatrix} 1 & 1 & 1 & 26 \\ 0 & 1 & -2 & 0 \\ 3 & -2 & 0 & 0 \end{pmatrix}$$

$$\left. \begin{aligned} x + y + z &= 26 \\ y &= 2z \\ x &= \frac{2}{3}y \end{aligned} \right\}$$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 0 & 1 & -2 \\ 3 & -2 & 0 \end{vmatrix} = (0+0-6) - (3+4-0) = -13 \neq 0$$

$\text{rang } A = \text{rang } A^* = 3 \Rightarrow$ Sistema compatible Determinado

$$\left. \begin{aligned} x + y + z &= 26 \\ y - 2z &= 0 \\ 3x - 2y &= 0 \end{aligned} \right\}$$

$$x = \frac{\begin{vmatrix} 26 & 1 & 1 \\ 0 & 1 & -2 \\ 0 & -2 & 0 \end{vmatrix}}{-13} = \frac{-104}{-13} = \boxed{8}$$

$$y = \frac{\begin{vmatrix} 1 & 26 & 1 \\ 0 & 0 & -2 \\ 3 & 0 & 0 \end{vmatrix}}{-13} = \frac{-156}{-13} = \boxed{12}$$

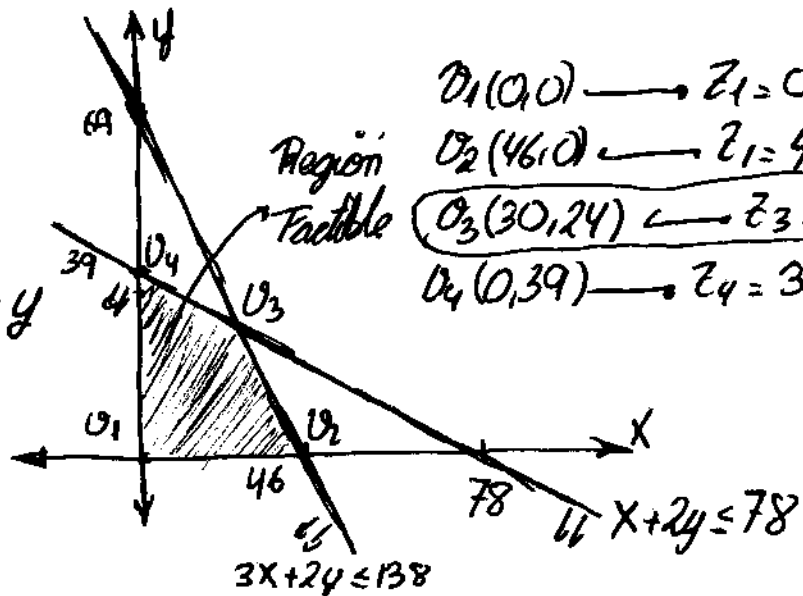
$$z = \frac{\begin{vmatrix} 1 & 1 & 26 \\ 0 & 1 & 0 \\ 3 & -2 & 0 \end{vmatrix}}{-13} = \frac{-78}{-13} = \boxed{6}$$

4- leyenda:

$x =$ lotes tipo A }
 $y =$ " " B }

max $z = f(x, y) = 0,9x + y$

sa: $\left. \begin{aligned} x + 2y &\leq 78 \\ 3x + 2y &\leq 138 \\ x, y &\geq 0 \end{aligned} \right\}$



$O_1(0,0) \rightarrow z_1 = 0$

$O_2(46,0) \rightarrow z_2 = 41,4$

$O_3(30,24) \rightarrow z_3 = 51$

$O_4(0,39) \rightarrow z_4 = 39$

Hay que preparar 30 lotes del tipo A y 24 del tipo B, para obtener unos ingresos máximos de 51€.

5. leyenda

x = dinero ganado por la madre
 y = " " " el padre
 z = " " " el hermano mayor

M. Asociada

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 4 & -5 & 0 \\ 2 & -1 & -2 \end{pmatrix}$$

M. Ampliado

$$A^* = \begin{pmatrix} 1 & 1 & 1 & 66000 \\ 4 & -5 & 0 & 0 \\ 2 & -1 & -2 & 0 \end{pmatrix}$$

$$\left. \begin{aligned} X+y+z &= 66000 \\ X &= 125y \\ y+z &= X + \frac{y}{2} \end{aligned} \right\}$$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 4 & -5 & 0 \\ 2 & -1 & -2 \end{vmatrix} = (10 - 4 + 0) - (-10 + 0 - 8) = 6 + 18 = 24 \neq 0$$

$\text{rang } A = \text{rang } A^* = 3 \Rightarrow$ Sistema Compatible Determinado

$$\left. \begin{aligned} X+y+z &= 66000 \\ 4x-5y &= 0 \\ 2x-y-2z &= 0 \end{aligned} \right\}$$

$$x = \frac{\begin{vmatrix} 66000 & 1 & 1 \\ 0 & -5 & 0 \\ 0 & -1 & -2 \end{vmatrix}}{24} = \frac{66000}{24} = \boxed{27500}$$

$$y = \frac{\begin{vmatrix} 1 & 1 & 66000 \\ 4 & -5 & 0 \\ 2 & 0 & -2 \end{vmatrix}}{24} = \frac{528000}{24} = \boxed{22000}$$

$$z = \frac{\begin{vmatrix} 1 & 1 & 66000 \\ 4 & -5 & 0 \\ 2 & -1 & 0 \end{vmatrix}}{24} = \frac{396000}{24} = \boxed{16500}$$

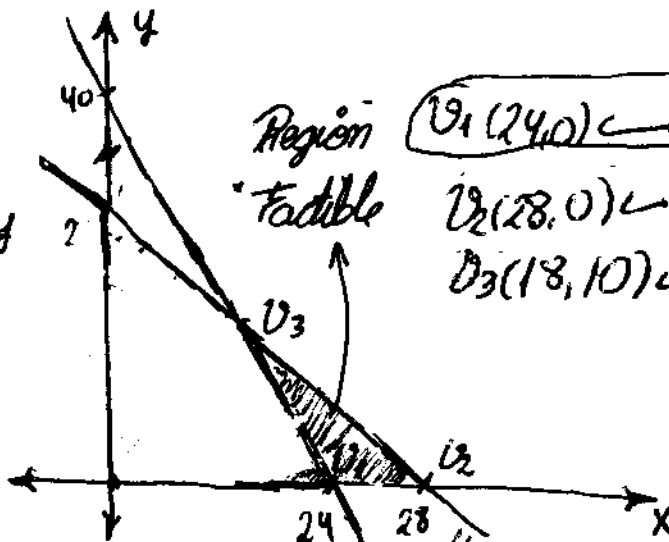
6. leyenda

x = n. de autobuses
 y = n. de microbuses

$$\min z = f(x,y) = 252x + 180y$$

sa:

$$\left. \begin{aligned} 50x + 30y &\geq 1200 \\ x + y &\leq 28 \\ x, y &\geq 0 \end{aligned} \right\}$$



Región $V_1(24,0) \leftarrow z_1 = 6048$

Factible $V_2(28,0) \leftarrow z_2 = 7056$

$V_3(18,10) \leftarrow z_3 = 6336$

Habría que contratar 24 autobuses y ningún microbus para tener un coste mínimo de 6048 €.

7. Legenda

x = hojas colocadas por Elena
 y = " " " Pedro
 z = " " " Juan

M. Asociado

$$A = \begin{pmatrix} 1 & -4 & 1 \\ 1 & 0 & -1 \\ 1 & 1 & 0 \end{pmatrix}$$

M. Ampliado

$$A^* = \begin{pmatrix} 1 & -4 & 1 & 0 \\ 1 & 0 & -1 & -100 \\ 1 & 1 & 0 & 850 \end{pmatrix}$$

$$|A| = \begin{vmatrix} 1 & -4 & 1 \\ 1 & 0 & -1 \\ 1 & 1 & 0 \end{vmatrix} = (0+1+4) - (0-1+0) = 6 \neq 0$$

$$\left. \begin{aligned} y &= 0.20(x+y+z) \\ z - 100 &= x \\ x + y &= 850 \end{aligned} \right\}$$

$\text{rang} A = \text{rang} A^* = 3 \rightarrow$ Sistema compatible Determinado

$$\left. \begin{aligned} x - 4y + z &= 0 \\ x - z &= -100 \\ x + y &= 850 \end{aligned} \right\}$$

$$x = \frac{\begin{vmatrix} 0 & -4 & 1 \\ -100 & 0 & -1 \\ 850 & 1 & 0 \end{vmatrix}}{6} = \frac{3300}{6} = \boxed{550}$$

$$y = \frac{\begin{vmatrix} 1 & 0 & 1 \\ 1 & -100 & -1 \\ 1 & 850 & 0 \end{vmatrix}}{6} = \frac{1800}{6} = \boxed{300}$$

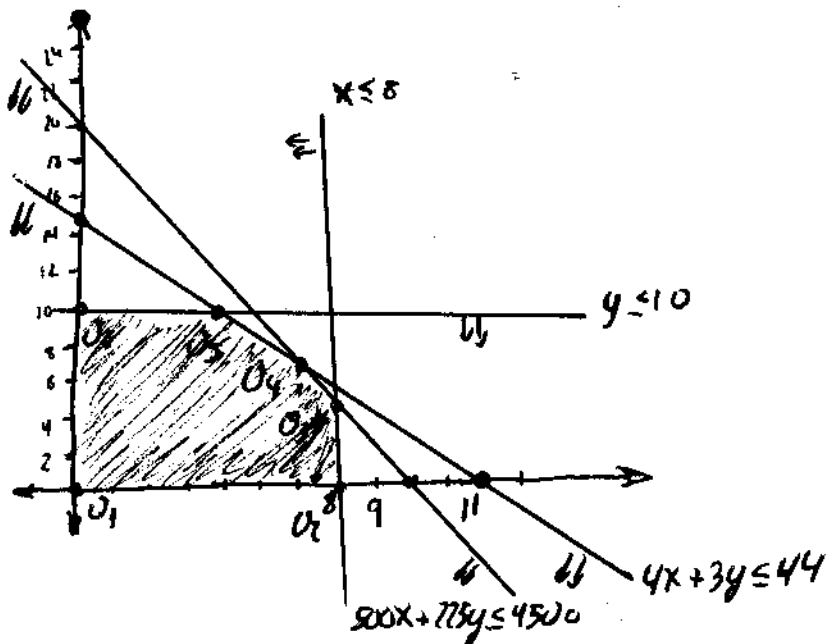
$$z = \frac{\begin{vmatrix} 1 & -4 & 0 \\ 0 & -100 & -1 \\ 1 & 850 & 0 \end{vmatrix}}{6} = \frac{3900}{6} = \boxed{650}$$

8. Legenda

x = olivos tipo A
 y = " " B
 $\max z = f(x,y) = 500x + 300y$

sa:

$$\left. \begin{aligned} x &\leq 8 \\ y &\leq 10 \\ 4x + 3y &\leq 44 \\ 500x + 225y &\leq 4500 \\ x, y &\geq 0 \end{aligned} \right\}$$



- $O_1(0,0) \rightarrow z_1 = 0$
- $O_2(8,0) \rightarrow z_2 = 4000$
- $O_3(8,2) \rightarrow z_3 = 4600$
- $O_4(6, \frac{20}{3}) \rightarrow z_4 = 5000$
- $O_5(7.5, 10) \rightarrow z_5 = 4750$
- $O_6(0,10) \rightarrow z_6 = 3000$

Hay que plantar 6 hectareas del olivo A y $\frac{20}{3}$ ha del olivo B para obtener una produccion max de 5000 litros

9) deyenda

$x \equiv$ niños que recibe el colegio A
 $y \equiv$ " " " " " B
 $z \equiv$ " " " " " C

M. Asociada

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & -4 \\ 1 & -1 & -2 \end{pmatrix}$$

M. Ampliada

$$A^* = \begin{pmatrix} 1 & 1 & 1 & 176 \\ 1 & 0 & -4 & 0 \\ 1 & -1 & -2 & -1 \end{pmatrix}$$

$$x + y + z = 176$$

$$z = \frac{x}{4}$$

$$x - y + z = 2z$$

$$x + y + z = 176$$

$$x - 4z = 0$$

$$x - y - 2z = -1$$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 0 & -4 \\ 1 & -1 & -2 \end{vmatrix} = (0 \cdot 1 \cdot 4) - (0 \cdot 4 \cdot 2) = -5 - 2 = -7 \neq 0$$

$\text{rang } A = \text{rang } A^* = 3 \rightarrow$ Sistema Compatible Determinado

$$x = \frac{\begin{vmatrix} 176 & 1 & 1 \\ 0 & 0 & -4 \\ -1 & -1 & -2 \end{vmatrix}}{-7} = \frac{-700}{-7} = \boxed{100}$$

$$y = \frac{\begin{vmatrix} 176 & 1 & 1 \\ 1 & 0 & -4 \\ -1 & -1 & -2 \end{vmatrix}}{-7} = \frac{-357}{-7} = \boxed{51}$$

$$z = \frac{\begin{vmatrix} 1 & 1 & 176 \\ 1 & 0 & 0 \\ 1 & -1 & -1 \end{vmatrix}}{-7} = \frac{-175}{-7} = \boxed{25}$$

10) deyenda

$x \equiv$ inversión en A

$y \equiv$ " " B

$$\max z = f(x, y) = 0'12A + 0'08B$$

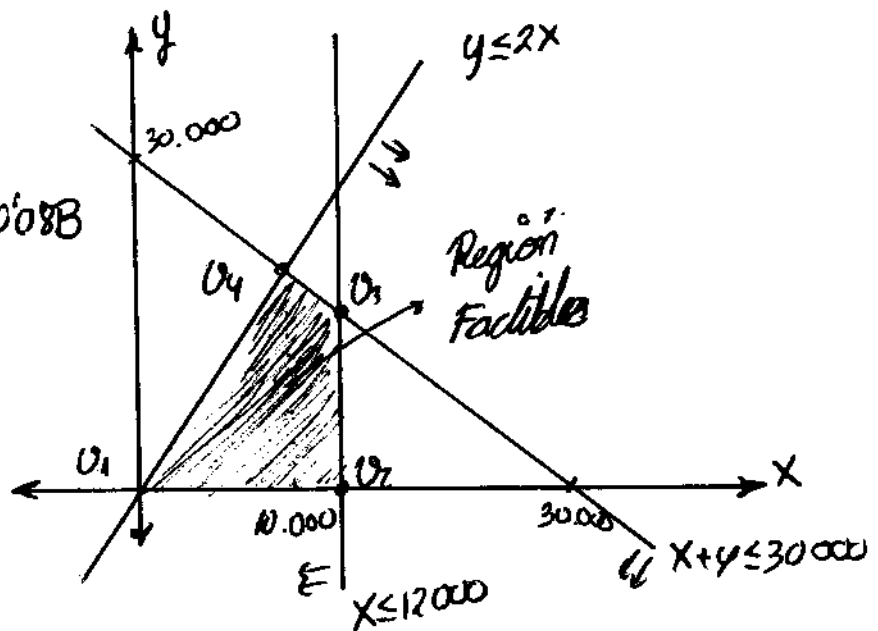
sa:

$$x + y \leq 30000$$

$$x \leq 12000$$

$$y \leq 2x$$

$$x, y \geq 0$$



$$O_1(0,0) \rightarrow z_1 = 0$$

$$O_2(12000,0) \rightarrow z_2 = 1440$$

$$O_3(12000,18000) \rightarrow z_3 = 2880$$

$$O_4(10000,20000) \rightarrow z_4 = 2800$$

Hay que invertir 12.000 € en A y 18.000 en B para obtener un beneficio de 2880 €.