



**Centro de Ciencias Básicas**

**Materia: Calculo Diferencial**

**Tarea I**

Ejercicios de conocimientos previos

Ingeniería en Computación Inteligente

Semestre 1° A

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# CONOCIMIENTOS PREVIOS

1. Efectue los siguientes productos notables.

$$\begin{aligned} a) (x+7)(x-13) \\ = x^2 - 13x + 7x - 91 \\ = x^2 - 6x - 91 \end{aligned}$$

$$\begin{aligned} b) (2x-7)(2x-7) \\ = 4x^2 - 14x - 14x + 49 \\ = 4x^2 - 28x + 49 \end{aligned}$$

$$\begin{aligned} c) (2-5x)(5x+2) \\ = (-5x+2)(5x+2) \\ = -25x^2 - 10x + 10x + 4 \\ = -25x^2 + 4 \end{aligned}$$

$$\begin{aligned} d) (x^2-6)(x^2-4) \\ = x^4 - 4x^2 - 6x^2 + 24 \\ = x^4 - 10x^2 + 24 \end{aligned}$$

$$\begin{aligned} e) (2x-3)^3 \\ = (2x)^3 + 3(2x)^2(-3) + 3(2x)(-3)^2 + (-3)^3 \\ = 8x^3 + 3(4x^2)(-3) + 3(2x)(9) - 27 \\ = 8x^3 - 36x^2 + 54x - 27 \end{aligned}$$

$$\begin{aligned} f) (x+2-3i)(x+2+3i) \\ = (x+2)^2 - (3i)^2 \\ = x^2 + 2(2x) + 4 - (3i)^2 \\ = x^2 + 4x + 4 - 9i \end{aligned}$$

$$\begin{aligned} g) (x-\sqrt{2})(x+\sqrt{2}) \\ = x^2 + \sqrt{2}x - \sqrt{2}x - (\sqrt{2})(\sqrt{2}) \\ = x^2 - 2 \end{aligned}$$

$$\begin{aligned} h) (x-\sqrt{2})^2 \\ = x^2 - 2(\sqrt{2})x + 2 \end{aligned}$$

$$\begin{aligned} i) (x-3)(x^2+3x+9) \\ = x^3 + 3x^2 + 9x - 3x^2 - 9x - 27 \\ = x^3 - 27 \end{aligned}$$

2. Factorice las siguientes expresiones algebraicas.

$$\begin{aligned} a) x^2 + 64x \\ = x(x+64) \end{aligned}$$

$$\begin{aligned} b) x^2 - 81 \\ = (x-9)(x+9) \end{aligned}$$

$$\begin{aligned} l) x^4 - 16 \\ = (x^2-4)(x^2+4) \end{aligned}$$

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d)  $125x^3 + 64$

$= (5x)^3 + (4)^3$

$= (5x + 4)(25x^2 - 20x + 16)$

e)  $x^3 - 64$

$= (x)^3 - (4)^3$

$= (x - 4)(x^2 + 4x + 16)$

f)  $x^2 - 16x + 64$

$= (x - 8)(x - 8)$

g)  $4x^2 + 64x$

$= x(4x + 64)$

h)  $x^2 - x - 20$

$= (x - 5)(x + 4)$

i)  $x^3 + 9x^2$

$= x(x^2 + 9x)$

j)  $x^2 - 12x + 35$

$= (x - 7)(x - 5)$

k)  $x^2 - 12x + 36$

$= (x - 6)(x - 6)$

l)  $x^3 - 2x$

$= x(x^2 - 2)$

3. Resolver las siguientes ecuaciones cuadráticas usando factorización

a)  $x^2 - 11x + 18 = 0$

$= (x - 9)(x - 2) = 0$

$= x - 9 = 0 \quad y \quad x - 2 = 0$

$= x = 9 \quad y \quad x = 2$

b)  $x^2 - 81 = 0$

$= (x)^2 - (9)^2 = 0$

$= (x + 9)(x - 9) = 0$

$= x + 9 = 0 \quad y \quad x - 9 = 0$

$= x = -9 \quad y \quad x = 9$

c)  $x^2 + 12x + 36 = 0$

$= (x + 6)(x + 6)$

$= x + 6 = 0 \quad y \quad x + 6 = 0$

$= x = -6 \quad y \quad x = -6$

d)  $x^2 = 2x$

$= x^2 - 2x = 0$

$= x(x - 2) = 0$

$= x = 0 \quad y \quad x - 2 = 0$

$= x = 0 \quad y \quad x = 2$

e)  $x^2 - 16x + 64 = 0$

$= (x - 8)(x - 8)$

$= x - 8 = 0 \quad y \quad x - 8 = 0$

$= x = 8 \quad y \quad x = 8$



$$f) 3x^2 - 9x = 0$$

$$= 3x(x-3)$$

$$= 3x = 0 \quad y \quad x-3 = 0$$

$$= x = 0/3 \quad y \quad x = 3$$

$$= x = 0 \quad y \quad x = 3$$

$$g) x^2 - 10x + 24 = 0$$

$$= (x-6)(x-4)$$

$$= x-6 = 0 \quad y \quad x-4 = 0$$

$$= \underline{x=6} \quad y \quad \underline{x=4}$$

$$h) 3x^2 = 9x$$

$$= 3x^2 - 9x = 0$$

$$= 3x(x-3) = 0$$

$$= x = 0 \quad y \quad x = 3$$

$$= 3x = 0 \quad y \quad (x-3) = 0$$

$$= x = 0/3 \quad y \quad x = 3$$

4. Resolver las ecuaciones cuadráticas usando fórmula general.

$$a) x^2 = 4x - 9$$

$$= x^2 - 4x + 9 = 0$$

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(9)}}{2(1)}$$

$$= 4 \pm \sqrt{16 - 36} / 2$$

$$= 4 \pm \sqrt{-20} / 2$$

$$= x \notin \mathbb{R}$$

$$b) x^2 - 10x + 24 = 0$$

$$= \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(24)}}{2(1)}$$

$$= 10 \pm \sqrt{100 - 96} / 2$$

$$= 10 \pm 2 / 2$$

$$= x_1 = 10 + 2 / 2 = 6$$

$$= x_2 = 10 - 2 / 2 = 4$$

$$= \underline{x_1 = 6} \quad \underline{x_2 = 4}$$

$$c) x^2 + 12x + 36 = 0$$

$$= \frac{-12 \pm \sqrt{12^2 - 4(1)(36)}}{2(1)}$$

$$= -12 \pm \sqrt{144 - 144} / 2$$

$$= -12 \pm \sqrt{0} / 2$$

$$= x_1 = -12 / 2 = -6$$

$$= \underline{x = -6}$$

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$$d) x^2 = 2x$$

$$= x^2 - 2x = 0$$

$$= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(0)}}{2(1)}$$

$$= 2 \pm \sqrt{4} / 2$$

$$= 2 \pm 2 / 2$$

$$= x_1 = 2 + 2 / 2 = 2$$

$$= x_2 = 2 - 2 / 2 = 0$$

$$= x_1 = \underline{\underline{2}} \text{ y } x_2 = \underline{\underline{0}}$$

$$e) x^2 + 81 = 0$$

$$= \frac{- (0) \pm \sqrt{(0)^2 - 4(1)(81)}}{2(1)}$$

$$= \pm \sqrt{-324} / 2$$

$$= x = x \notin \mathbb{R}$$

$$f) x^2 - 4x + 8 = 0$$

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(8)}}{2(1)}$$

$$= 4 \pm \sqrt{-16} / 2$$

$$= x = x \notin \mathbb{R}$$

$$g) 2x^2 + 7x = 15$$

$$= 2x^2 + 7x - 15 = 0$$

$$= \frac{- (7) \pm \sqrt{(7)^2 - 4(2)(-15)}}{2(2)}$$

$$= -7 \pm \sqrt{169} / 2$$

$$= -7 \pm 13 / 2(2)$$

$$= -7 \pm 13 / 4$$

$$= x_1 = -7 + 13 / 4 = 1.5$$

$$= x_2 = -7 - 13 / 4 = -5$$

$$= x_1 = 1.5 \text{ y } x_2 = -5$$

$$h) 3x^2 = 9x$$

$$= 3x^2 - 9x = 0$$

$$= \frac{-(-9) \pm \sqrt{(-9)^2 - 4(3)(0)}}{2(3)}$$

$$= 9 \pm \sqrt{81} / 6$$

$$= 9 \pm 9 / 6$$

$$= x_1 = 9 + 9 = 18 / 6 = 3$$

$$x_2 = 9 - 9 = 0 / 6 = 0$$

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5. Encuentre la gráfica de las siguientes funciones lineales.  
Obtenga la ordenada al origen, pendiente de la recta e intersección con el eje x.

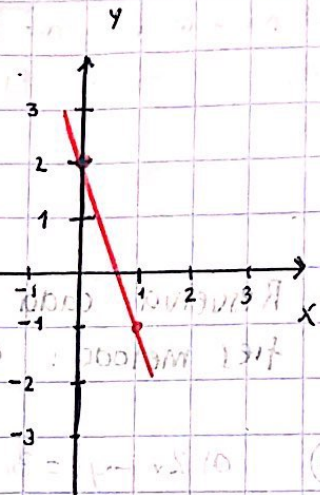
a)  $f(x) = -3x + 2$

pendiente = -3

ordenada al origen = 2

intersección en x =  $(0.666, 0)$

$-3x + 2 = 0$   
 $-2 = -3x \rightarrow -2/-3 = x = 0.666$

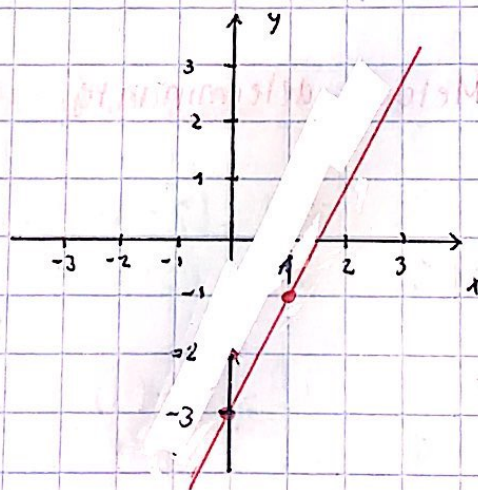


b)  $g(x) = 2x - 3$

pendiente = 2

ordenada al origen = -3

intersección en x =  $(1.5, 0)$



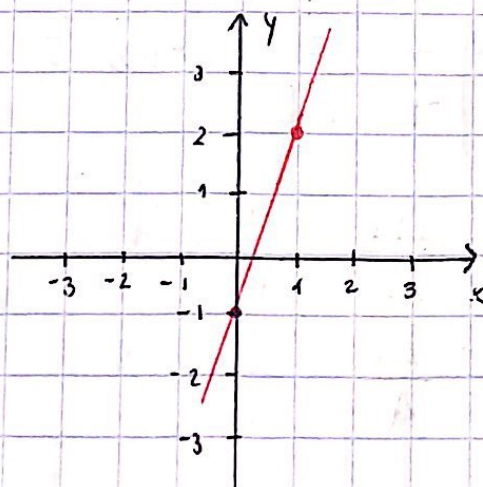
c)  $f(x) = 3x - 1$

pendiente = 3

ordenada al origen = -1

intersección en x =  $(0.33, 0)$

$3x - 1 = 0$   
 $1 = 3x \rightarrow 1/3 = x$   
 $x = 0.333$



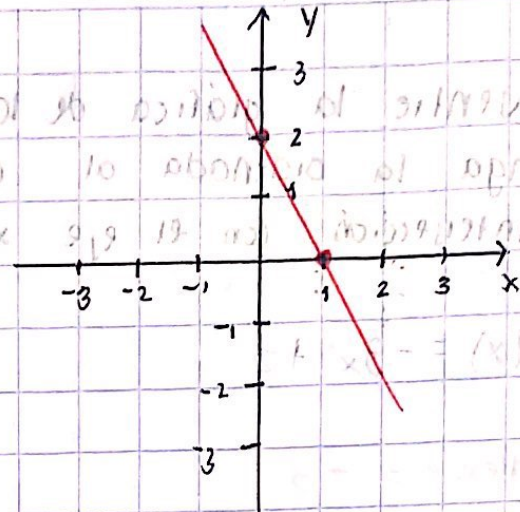


$$d) g(x) = -2x + 2$$

$$\text{pendiente} = -2$$

$$\text{ordenada al origen} = 2$$

$$\text{intersección en } x = (1, 0)$$



6. Resuelva cada sistema de ecuaciones lineales por los tres métodos: a) Sumas y restas, b) Método gráfico, c) Determinantes.

$$\begin{aligned} \textcircled{1} \quad & a) 2x - y = 3 \\ & b) -x + y = 1 \end{aligned}$$

Método determinante

$$\Delta = \begin{vmatrix} 2 & -1 \\ -1 & 1 \end{vmatrix} = 2 - (1) = 1$$

$$\Delta x = \begin{vmatrix} 3 & -1 \\ 1 & 1 \end{vmatrix} = 3 - (-1) = 4$$

$$\Delta y = \begin{vmatrix} 2 & 3 \\ -1 & 1 \end{vmatrix} = 2 - (-3) = 5$$

$$x = \frac{\Delta x}{\Delta} = \frac{4}{1} = 4$$

$$y = \frac{\Delta y}{\Delta} = \frac{5}{1} = 5$$

Método suma y resta

$$2x - y = 3 \quad \text{I} \quad -2x + 1y = 3 \quad \text{II}$$

$$2(-x + y = 1) = -2x + 2y = 2$$

$$x = 2$$

$$y = 5$$

$$2x - (5) = 3$$

$$2x = 3 + 5 \quad -x = 4$$

$$2x - 5 = 3$$

$$2x = 8$$

$$\boxed{y = 5} \quad \boxed{x = 4}$$

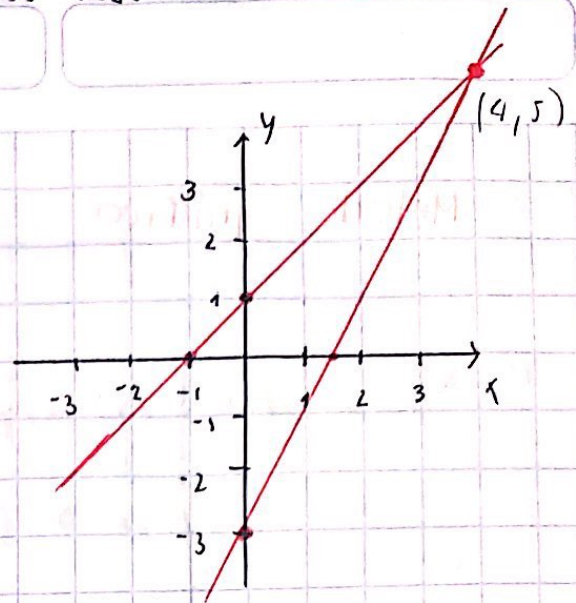
$$\boxed{\begin{matrix} x = 4 \\ y = 5 \end{matrix}}$$

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### Metodo gráfico

x	y	x	y
0	-3	0	1
1.5	0	-1	0



a)

$$\begin{aligned} 2(0) - y &= 3 \Rightarrow -y = 3 \Rightarrow y = 3/-1 = -3 \\ 2(x) - (0) &= 3 \Rightarrow 2x = 3 \Rightarrow x = 3/2 = 1.5 \end{aligned}$$

b)

$$\begin{aligned} -x + y &= 1 \Rightarrow -(0) + y = 1 \Rightarrow y = 1 \\ -x + (0) &= 1 \Rightarrow -x = 1 \Rightarrow x = -1 \end{aligned}$$

(4, 5)
x y

② a)  $2x - 3y = 0$

b)  $2x + 3y = 0$

### Metodo determinante

$$\Delta = \begin{vmatrix} 2 & -3 \\ 2 & 3 \end{vmatrix} = 6 - (-6) = 12$$

$$\Delta_x = \begin{vmatrix} 0 & -3 \\ 0 & 3 \end{vmatrix} = 0 - 0 = 0$$

$$\Delta_y = \begin{vmatrix} 2 & 0 \\ 2 & 0 \end{vmatrix} = 0 - 0 = 0$$

### Metodo suma y resta

$$2(2x - 3y = 0) \Rightarrow 4x - 6y = 0$$

$$2(2x + 3y = 0) \Rightarrow 4x + 6y = 0$$

$$= 0$$

x = 0	y = 0
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$$x = \frac{\Delta_x}{\Delta} = \frac{0}{12} = 0$$

$$y = \frac{\Delta_y}{\Delta} = \frac{0}{12} = 0$$

x = 0	y = 0
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②

a)  $2x - 3y = 0$

b)  $2x + 3y = 12$

Método determinante

$$\Delta = \begin{vmatrix} 2 & -3 \\ 2 & 3 \end{vmatrix} = 6 - (-6) = 12$$

$$\Delta_x = \begin{vmatrix} 0 & -3 \\ 12 & 3 \end{vmatrix} = 0 - (-36) = 36$$

$$\Delta_y = \begin{vmatrix} 2 & 0 \\ 2 & 12 \end{vmatrix} = 24 - 0 = 24$$

Método suma y resta

$$\begin{array}{rcl} 2x - 3y & = & 0 \\ -1(2x + 3y) & = & -12 \\ \hline & & -6y = -12 \\ & & y = -12 / -6 = 2 \end{array}$$

$$\begin{array}{rcl} 2x - 3(2) & = & 0 \\ 2x - 6 & = & 0 \\ 2x & = & 6 \\ x & = & 3 \end{array}$$

$$\boxed{\begin{array}{l} x = 3 \\ y = 2 \end{array}}$$

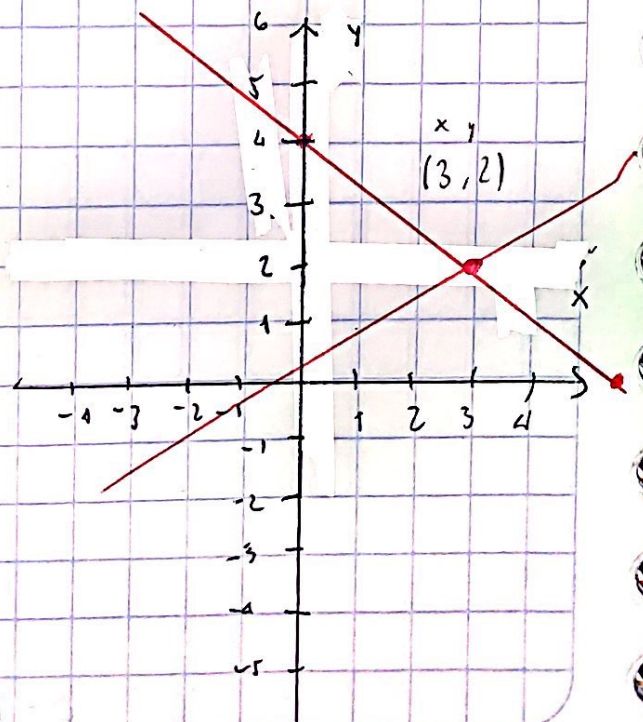
$$x = \frac{\Delta_x}{\Delta} = \frac{36}{12} = 3 \quad y = \frac{\Delta_y}{\Delta} = \frac{24}{12} = 2$$

$$\boxed{x = 3 \quad y = 2}$$

Método gráfico

x	y	x	y
0	0	6	0
0	0	0	4

$$\boxed{\begin{array}{l} x = 3 \\ y = 2 \end{array}}$$



a)

$$2x - 3(0) = 0, \quad 2x = 0 \quad x = 0$$

$$2(0) - 3y = 0, \quad -3y = 0 \quad y = 0$$

b)

$$2x + 3(0) = 12, \quad 2x = 12 \quad x = 6$$

$$2(0) + 3y = 12, \quad 3y = 12 \quad y = 4$$

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