



ALGEBRA

Chapter 16

2th

Session I

FACTORIZACION III



 **SACO OLIVEROS**

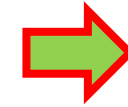
HELICO MOTIVATING



Al expresar un polinomio como la multiplicación de otros polinomios pertenecientes a un conjunto dado, se ha efectuado una factorización de polinomios.

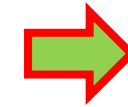
De acuerdo a las características que presentan los polinomios se puede aplicar tal o cual criterio, por ejemplo:

$$ax^2y^2 + bxy^3z + cx^3my^4$$



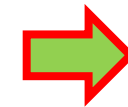
Factor común

$$Ax^{2n} + Bx^ny^m + Cy^{2m}$$



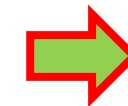
Aspa simple

$$Ax^{2n} + Bx^ny^m + Cy^{2m} + Dx^n + Ey^m + F$$



Aspa doble

$$Ax^{4n} + Bx^{3n} + Cx^{2n} + Dx^n + E$$



Aspa doble especial

HELICO THEORY

CHAPTER 16



CRITERIO DE LAS ASPAS

1 ASPA SIMPLE

- ✓ Descomponer los extremos en 2 factores.
- ✓ La suma del producto en aspa debe ser igual al T. central
- ✓ Los factores se toman de manera horizontal

$$Ax^{2m} + Bx^m y^n + Cy^{2n}$$

$$\left. \begin{array}{l} cy^n = bcx^m y^n \\ dy^n = adx^m y^n \end{array} \right\} +$$

$$Bx^m y^n$$

$$(ax^m + cy^n)(bx^m + dy^n)$$



Ejemplo:

Factorizar $6x^2 + 13xy + 5y^2$

Resolución:

$$6x^2 + 13xy + 5y^2$$

$$\begin{array}{l} 3x \quad \quad \quad 5y = 10xy \\ 2x \quad \quad \quad y = \underline{3xy} \\ \quad \quad \quad \quad \quad 13xy \end{array} +$$

$$(3x + 5y)(2x + y)$$



2 ASPA DOBLE

Se aplican 3 aspases simples

$$Ax^{2m} + Bx^m y^n + Cy^{2n} + Dx^m + Ey^n + F$$

Diagram illustrating the double ASPA method. The polynomial is shown in a box. Below it, terms are grouped into two factors: $ax^m + cy^n + e$ and $bx^m + dy^n + f$. Red arrows indicate the cross-multiplication process: $a \times B$, $c \times D$, and $e \times F$. Dashed yellow lines connect a to b and c to d . Dashed green lines connect e to f .

El polinomio factorizado será

$$(ax^m + cy^n + e)(bx^m + dy^n + f)$$



Ejemplo:

Factorizar $2x^2 + 7xy + 3y^2 + 7x + 16y + 5$

Resolución:

$$2x^2 + 7xy + 3y^2 + 7x + 16y + 5$$

Diagram illustrating the factorization process using the AC method. The polynomial is written at the top. Below it, the terms $2x$, x , y , $3y$, 5 , and 1 are arranged in two rows. Dashed yellow lines connect $2x$ to $3y$ and x to y . Dashed green lines connect $2x$ to 1 and x to 5 . Red arrows point from the middle terms $7xy$, $7x$, and $16y$ to the connections between the first and second rows. Below the terms, three fractions are shown: $\frac{6xy}{xy} = 7xy$, $\frac{y}{15y} = 16y$, and $\frac{2x}{5x} = 7x$.

$$(2x + y + 5)(x + 3y + 1)$$

HELICO PRACTICE

CHAPTER 16



1. Factorice e indique un factor primo

$$P(x) = x^2 + 17x + 72$$

RESOLUCIÓN

$$P(x) = x^2 + 17x + 72$$

$$\begin{array}{l} x \\ x \end{array} \rightarrow \begin{array}{l} 8 = 8x \\ 9 = 9x \end{array} +$$

$$17x$$

$$P(x) = (x + 8) (x + 9)$$

Factores Primos: $(x + 8)$; $(x + 9)$



2. *Luego de factorizar sume sus factores primos*

$$T(x) = x^2 - 11x + 30$$

RESOLUCIÓN

$$T(x) = x^2 - 11x + 30$$

$$\begin{array}{rcl}
 x & \searrow & -6 = -6x \\
 x & \nearrow & -5 = -5x \\
 \hline
 & & -11x
 \end{array}
 +$$

$$T(x) = (x - 6)(x - 5)$$

Piden :

$$\underline{x} - \underline{6} + \underline{x} - \underline{5} = 2x - 11$$

$$\therefore \Sigma f.p = 2x - 11$$



3. Factorice e indique la suma de los términos independientes

$$Q(x) = x^4 - 26x^2 + 25$$

RESOLUCIÓN

$$Q(x) = x^4 - 26x^2 + 25$$

$$\begin{array}{rcl} x^2 & \searrow & -25 = -25x^2 \\ x^2 & \swarrow & -1 = -1x^2 \\ & & \hline & & -26x^2 \end{array} +$$

$$Q(x) = (x^2 - 25)(x^2 - 1)$$

$$Q(x) = (x + 5)(x - 5)(x + 1)(x - 1)$$

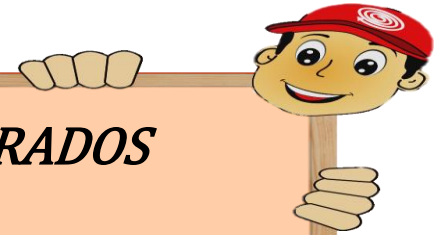
Piden :

$$\cancel{5} - \cancel{5} + \cancel{1} - \cancel{1} = 0$$

RECUERDA

DIFERENCIA DE CUADRADOS

$$a^2 - b^2 = (a + b)(a - b)$$



$$\therefore \Sigma T.I = 0$$



4. *Indique un factor primo del polinomio*

$$R(x; y) = 8x^2 - 6xy - 14y^2$$

RESOLUCIÓN

$$R(x; y) = 8x^2 - 6xy - 14y^2$$

$$\begin{array}{rcl}
 2x & & 2y = 8xy \\
 4x & & -7y = -14xy \\
 & & \hline
 & & -6xy
 \end{array}
 +$$

$$R(x; y) = (2x + 2y)(4x - 7y)$$

$$R(x; y) = 2(x + y)(4x - 7y)$$

Factores Primos: $(x + y)$; $(4x - 7y)$



5. El número de factores primos luego de factorizar

$$P(x) = x^4 - 10x^2 + 9 \text{ es}$$

RESOLUCIÓN

$$P(x) = x^4 - 10x^2 + 9$$

$$\begin{array}{rcl} x^2 & \searrow & -9 = -9x^2 \\ x^2 & \swarrow & -1 = -1x^2 \\ & & \underline{-10x^2} \end{array} +$$

$$P(x) = (x^2 - 9)(x^2 - 1)$$

$$P(x) = (x + 3)(x - 3)(x + 1)(x - 1)$$

RECUERDA

DIFERENCIA DE CUADRADOS

$$a^2 - b^2 = (a + b)(a - b)$$



$\therefore P(x)$ tiene 4 factores primos.



6. *Factorice e indique la suma de factores primos*

$$P(x; y) = 2x^2 + 5xy + 3y^2 + 3x + 4y + 1$$

RESOLUCIÓN

$$P(x; y) = 2x^2 + 5xy + 3y^2 + 3x + 4y + 1$$

$$\begin{array}{ccc} 2xy & 3y & 2x \\ 3xy & y & x \\ \hline 5xy & 4y & 3x \end{array}$$

$$P(x; y) = (2x + 3y + 1) (x + y + 1)$$

Piden :

$$\begin{aligned} & \underline{2x} + \underline{3y} + \underline{1} + \underline{x} + \underline{y} + \underline{1} \\ & = 3x + 4y + 2 \end{aligned}$$

$$\therefore \Sigma f.p = 3x + 4y + 2$$



7. *Indique un factor primo luego de factorizar*

$$T(x; y) = 6x^2 + 9xy - 15y^2 - 11x - 17y + 4$$

RESOLUCIÓN

$$T(x; y) = 6x^2 + 9xy - 15y^2 - 11x - 17y + 4$$

$$\begin{array}{rcl}
 3x & -3y & -4 \\
 2x & 5y & -1 \\
 \hline
 15xy & 3y & -3x \\
 -6xy & -20y & -8x \\
 \hline
 9xy & -17y & -11x
 \end{array}$$

$$T(x; y) = (3x - 3y - 4)(2x + 5y - 1)$$

Factores Primos: $(3x - 3y - 4)$; $(2x + 5y - 1)$



8. Myriam va al mercado con S/.20 a comprar solo frutas y gasta el valor de la suma de términos independientes de los factores primos luego de factorizar

$$P(x; y) = 4x^2 - 2xy - 2y^2 - 7y + x - 5$$

¿Cuánto le quedó a Myriam?

RESOLUCIÓN

$$T(x; y) = 4x^2 - 2xy - 2y^2 - 7y + x - 5$$

$$\begin{array}{r} -4xy \\ 2xy \\ \hline -2xy \end{array} \quad \begin{array}{r} -2y \\ -5y \\ \hline -7y \end{array} \quad \begin{array}{r} -4x \\ 5x \\ \hline x \end{array}$$

$$T(x; y) = (4x + 2y + 5)(x - y - 1)$$

Gasta

$$\Sigma \text{ T.I} = 5 - 1 = 4$$

Queda :

$$20 - 4$$

Le quedó S/. 16