UNIVERSIDAD DE CÓRDOBA
comprometida con el desarrollo regional

TEORÍA DE GRAFOS

UNIVERSIDAD DE CÓRDOBA

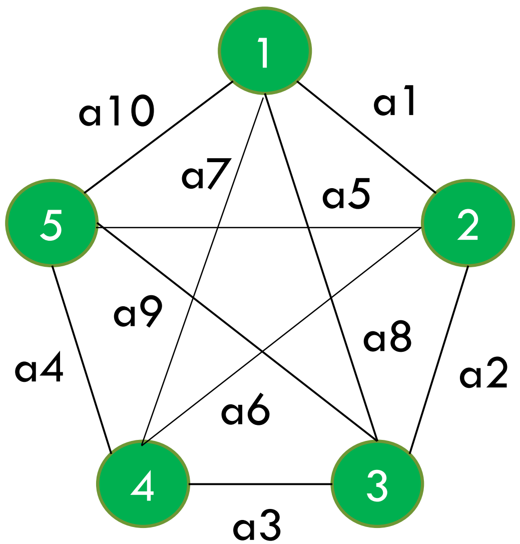
comprometida con el desarrollo regional

UNIDAD 2. SUBGRAFOS

SUBGRAFO

Definición: Se dice que un grafo H es un subgrafo de un grafo G si y sólo si, cada vértice en H es también un vértice en G, cada arista en H es también una arista en G y cada arista en H tiene los mismos puntos extremos de G.

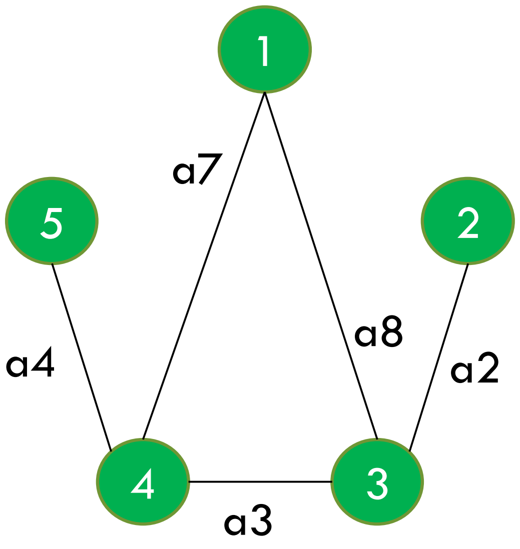
Ejemplo



Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8, a9,a10}

$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a5) = (5, 2),\ f_G(a6) = (2, 4), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a9) = (3, 5),\ f_G(a10) = (5, 1), \end{cases}$



Subgrafo H

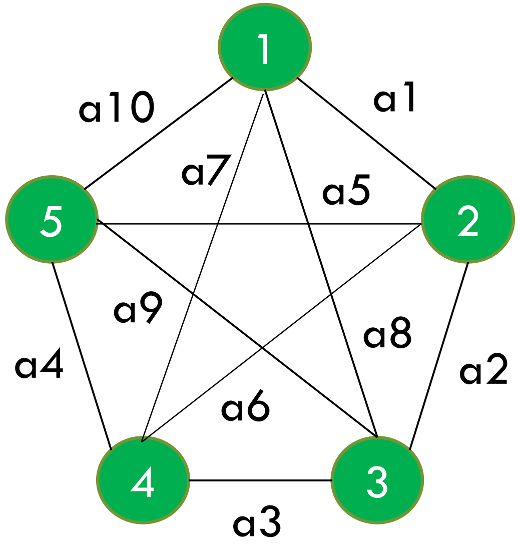
G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a2,a3,a4,a7,a8 }

$F_G = \begin{cases} f_G(a2) = (2, 3),\ f_G(a3) = (3, 4), \\ f_G(a4) = (4, 5),\ f_G(a7) = (4, 1), \\ f_G(a8) = (1, 3), \end{cases}$

SUBGRAFO COBERTOR

Definición: un subgrafo H de G se llama cobertor si contiene a todos los vértices de G.

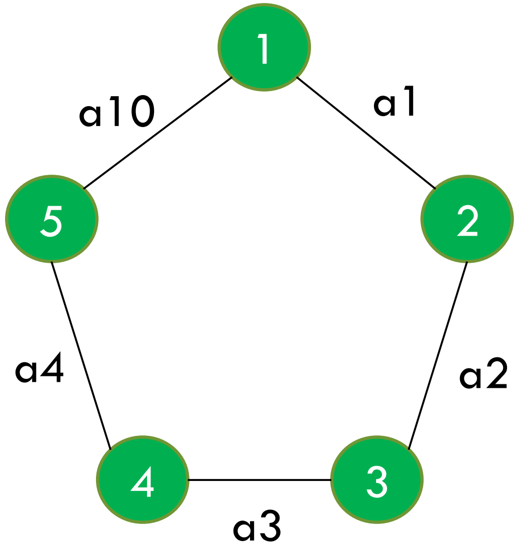
Ejemplo



Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8, a9,a10}

$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a5) = (5, 2),\ f_G(a6) = (2, 4), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a9) = (3, 5),\ f_G(a10) = (5, 1), \end{cases}$



cobertor H

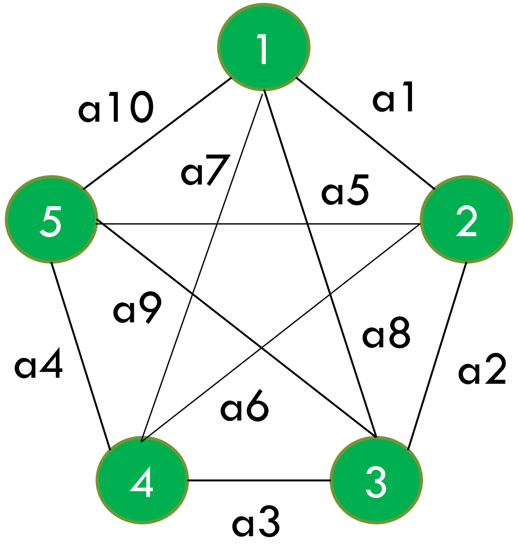
G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a10 }

$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a10) = (5, 1), \end{cases}$

VÉRTICES DISYUNTOS

Definición: Dos o más subgrafo de un grafo G son vértices-disyuntos, si no poseen vértices comunes.

Ejemplo

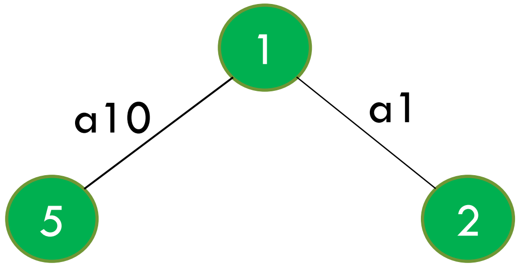


Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8, a9,a10}

$$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a5) = (5, 2),\ f_G(a6) = (2, 4), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a9) = (3, 5),\ f_G(a10) = (5, 1), \end{cases}$$

VÉRTICES DISYUNTOS

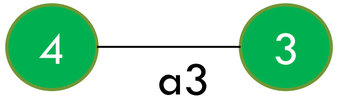


Subgrafo H3

G = (V, A, f)
G(V) = {1, 2, 5 }
f(A) = {a1,a10 }

$F_G = [\ f_G(a1) = (1, 2),\ f_G(a10) = (5, 1),$

El subgrafo H3 es vértice-disyunto del subgrafo H4



Subgrafo H4

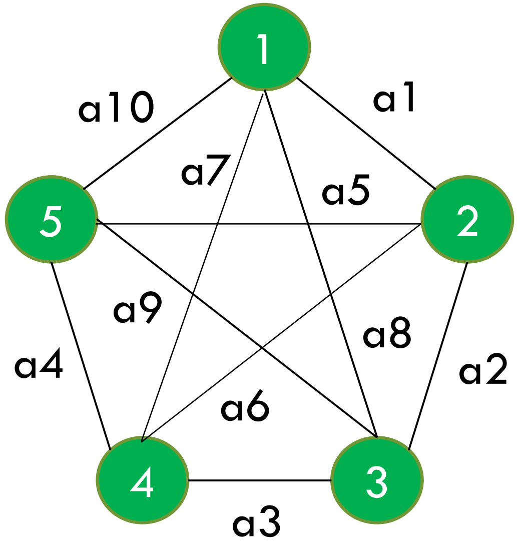
G = (V, A, f)
G(V) = {3, 4 }
f(A) = {a3 }

$F_G = [\ f_G(a3) = (3, 4)$

ARISTAS DISYUNTAS

Definición: Dos o más subgrafo de un grafo G son aristas-disyuntos, si ellos no poseen aristas comunes.

Ejemplo



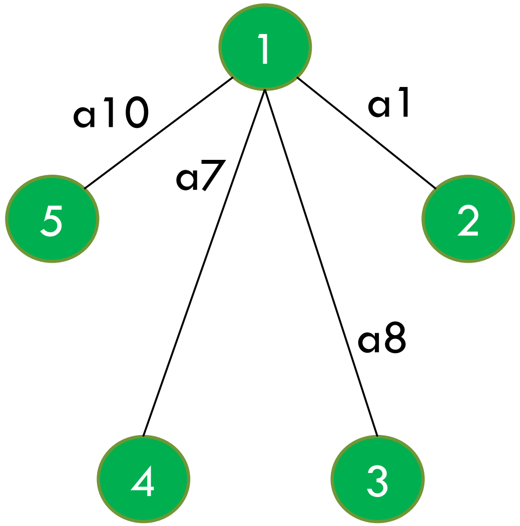
Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8, a9,a10}

$$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a5) = (5, 2),\ f_G(a6) = (2, 4), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a9) = (3, 5),\ f_G(a10) = (5, 1), \end{cases}$$

ARISTAS DISYUNTAS

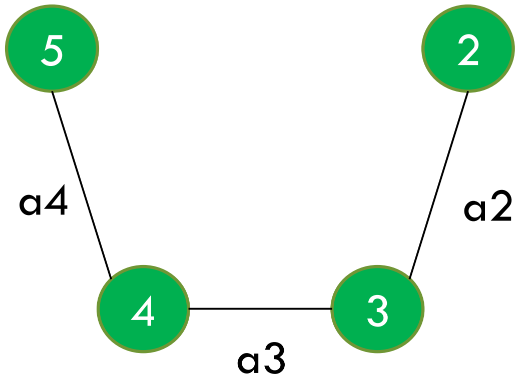
Los subgrafos H5 y H6 son aristas-disyuntas ya que no tienen aristas en comunes



Subgrafo H5

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a7,a8,a10}

$$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a5) = (5, 2), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a10) = (5, 1), \end{cases}$$



Subgrafo H6

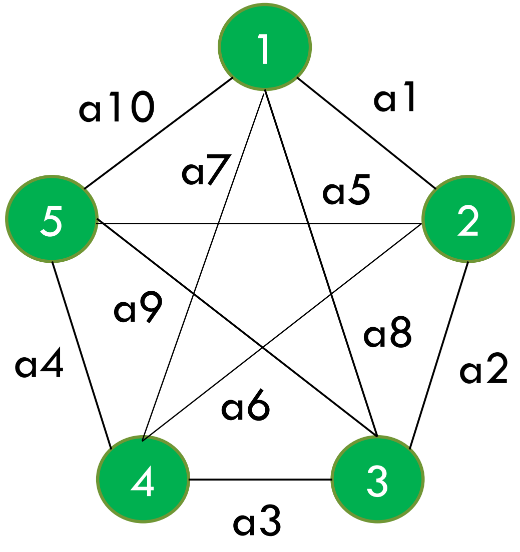
G = (V, A, f)
G(V) = { 2, 3, 4, 5 }
f(A) = {a2,a3,a4 }

$$F_G = \begin{cases} f_G(a2) = (2, 3),\ f_G(a3) = (3, 4), \\ f_G(a4) = (4, 5), \end{cases}$$

RESTANTE AL SUPRIMIR UN CONJUNTO DE VÉRTICES

Definición: Sea G un grafo con $|V| \geq 2$ y sea V ' ∈ V, la operación supresión de V ' consiste en suprimir de G los vértices de V ' y las aristas incidentes en ellos. Se denota G – {V '}.

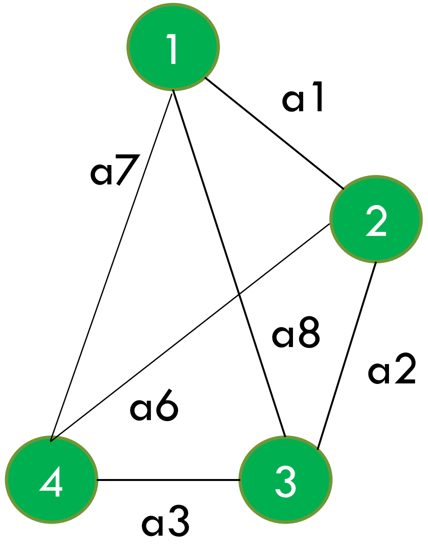
Ejemplo: **G** – {5}.



Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8,
a9,a10}

F_G = f_G(a1) = (1, 2), f_G(a2) = (2, 3),
f_G(a3) = (3, 4), f_G(a4) = (4, 5),
f_G(a5) = (5, 2), f_G(a6) = (2, 4),
f_G(a7) = (4, 1), f_G(a8) = (1, 3),
f_G(a9) = (3, 5), f_G(a10) = (5, 1),



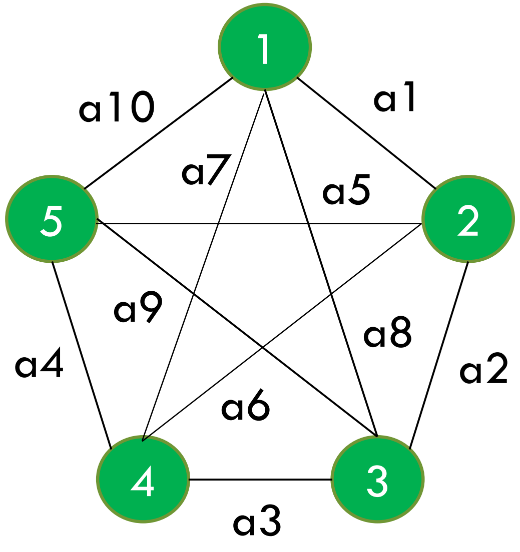
G = (V, A, f)
G(V) = {1, 2, 3, 4 }
f(A) = {a1,a2,a3,a4,a6,a7,a8,
a9,a10}

F_G = f_G(a1) = (1, 2), f_G(a2) = (2, 3),
f_G(a3) = (3, 4), f_G(a6) = (2, 4),
f_G(a7) = (4, 1), f_G(a8) = (1, 3),

SUPRIMIR UN CONJUNTO DE ARISTAS

Definición: Si A’ ∈ A, la operación supresión de A’ consiste en suprimir de G las aristas de A’. se denota G – {A’}

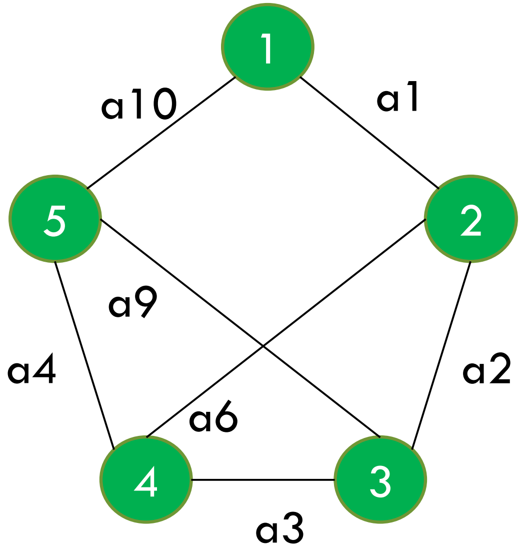
Ejemplo: **G** – {a5, a7, a8}.



Grafo G

G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a5,a6,a7,a8, a9,a10}

$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a5) = (5, 2),\ f_G(a6) = (2, 4), \\ f_G(a7) = (4, 1),\ f_G(a8) = (1, 3), \\ f_G(a9) = (3, 5),\ f_G(a10) = (5, 1), \end{cases}$



G = (V, A, f)
G(V) = {1, 2, 3, 4, 5 }
f(A) = {a1,a2,a3,a4,a6,a9,a10}

$F_G = \begin{cases} f_G(a1) = (1, 2),\ f_G(a2) = (2, 3), \\ f_G(a3) = (3, 4),\ f_G(a4) = (4, 5), \\ f_G(a6) = (2, 4),\ f_G(a9) = (3, 5), \\ f_G(a10) = (5, 1), \end{cases}$