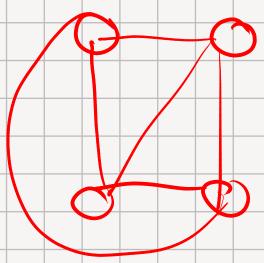
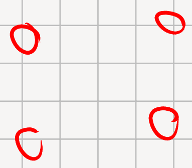
Grafos complementarios

Grafos simples <-- No dirigido, sin bucles ni aristas multiples

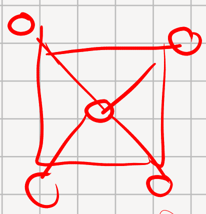
El grafo complementario se define K_n



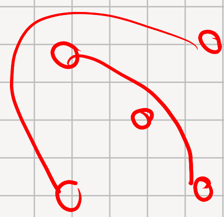
$K_4$



$\overline{K_4}$

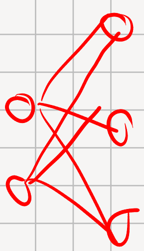


$\longrightarrow$

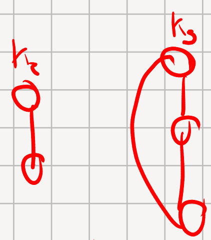


$W_4$ Rosen

$\overline{W_4}$ Rosen

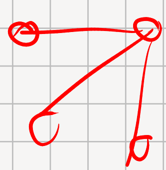


$K_{2,3}$



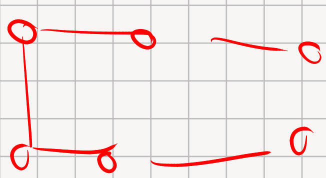

$\overline{K_{2,3}}$

Sec grado



$\{3, 1, 1, 1\}$

$C_n$

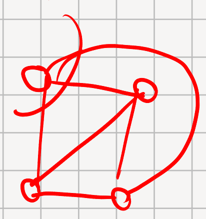


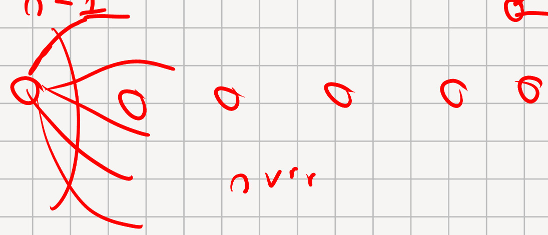
$\{2, 2, 2, \ldots, 2\}$

$W_n$ Rosen $\{n, \underbrace{3, 3, \dots, 3}_{n \text{ vertices}}\}$

Center

$K_n = \{n-1, n-1, \dots, n-1\}$




$K_n = \{n-1, n-1, n-1, \dots n-1\}$

$C_n = \{2, 2, 2, \dots 2\}$

$\overline{C_n} = \{n-3, n-3, n-3, \dots n-3\}$

$2e = n(n-3)$

$e = \frac{n(n-3)}{2}$

Wn Rosen

$$K_{n+1} = \{n, n, n, n, \dots n\}$$

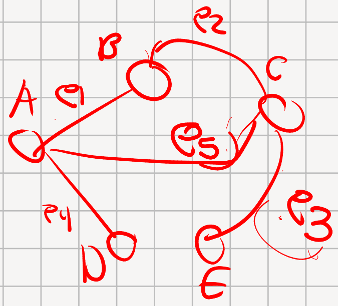
$$W_n = \{n, 3, 3, 3, \dots 3\}$$

$$W_n = \{0, n-3, n-3, \dots n-3\}$$

---

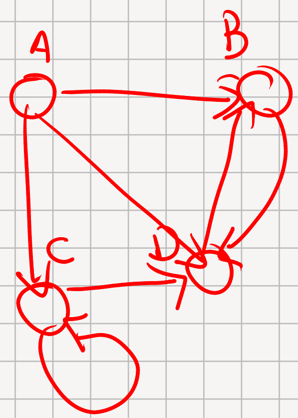
Representación
- Adyacencia $V \times V$
- Incidencia $V \times e$

$$M_{ij} = \begin{cases} 0 & \text{si no hay arista } i \text{ y } j \\ 1 & \text{en caso contrario} \end{cases}$$



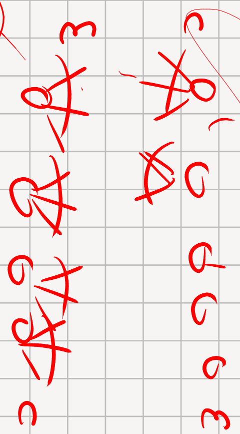

| | A | B | C | D | E |
|---|---|---|---|---|---|
| A | 0 | 1 | 1 | 1 | 0 |
| B | 1 | 0 | 1 | 0 | 0 |
| C | 1 | 1 | 0 | 0 | 1 |
| D | 1 | 0 | 0 | 0 | 0 |
| E | 0 | 0 | 1 | 0 | 0 |

| | e1 | e2 | e3 | e4 | e5 |
|---|---|---|---|---|---|
| A | 1 | 0 | 0 | 1 | 1 |
| B | 1 | 1 | 0 | 0 | 0 |
| C | 0 | 1 | 1 | 0 | 1 |
| D | 0 | 0 | 0 | 1 | 0 |
| E | 0 | 0 | 1 | 0 | 0 |




$$\begin{array}{c|cccc} & A & B & C & D \\ \hline A & 0 & 1 & 1 & 1 \\ B & 0 & 0 & 0 & 1 \\ C & 0 & 0 & 1 & 1 \\ D & 0 & 1 & 0 & 0 \end{array}$$

$K_{n,m}$

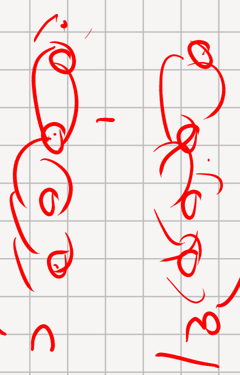



$$\{\underbrace{m, m, \dots m}_{n}, \underbrace{n, n, n, n}_{m}\}$$

$$K_{n+m}\{n+m-1,\ n+m-1,\ \dots\ n+m-1\}$$

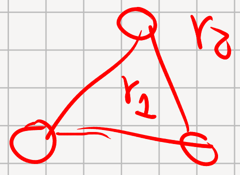
$$\overline{K_{n,m}} = \{\underbrace{n-1, n-1, n-1}_{n \text{ veces}}, \dots, \underbrace{m-1, m-2}_{m \text{ veces}}\}$$

$n-1$




$m-1$

Un grafo plano es aquel puedo dibujar SIN QUE LAS aristas se CRUCEN




$r = |e| - |v| + 2$

$3r \leq 2e$

$e \leq 3v - 6$

Si el CRITERIO le dice NO, no es plano
Si el CRITERIO le dice que SI; podria ser plano pero no se asegura.

$e = \frac{n(n-1)}{2}$

$K_4$

$V = 4$

$e = 6$

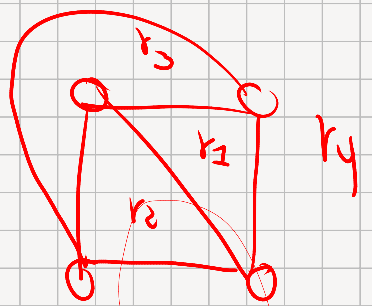
$r = 6 - 4 + 2 = 4$

$3(4) \leq 2(6)$

$12 \leq 12$ ✓

$6 \leq 3(4) - 6$

$6 \leq 6$ ✓




$K_5$ :

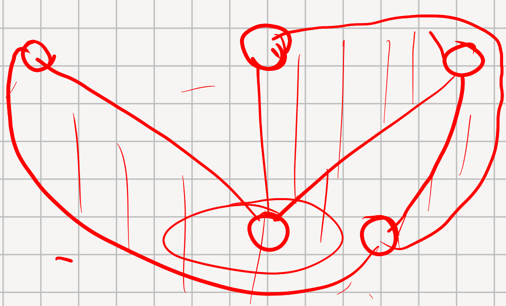
$V = 5$

$e = 10$

$r = 7$

$3(7) \leq 2(7)$

$21 \leq 14$ :( ✗



$K_{3,3}$

$V = 6$ $r = 5$

$e = 9$

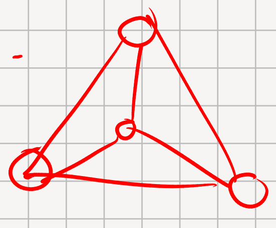
$3r \leq 2e$

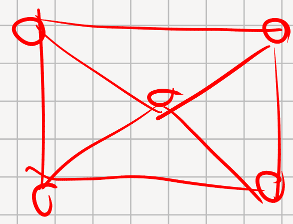
$15 \leq 18$ ✓

$e \leq 3v - 6$

$9 \leq 18 - 6$

$9 \leq 12$ ✓



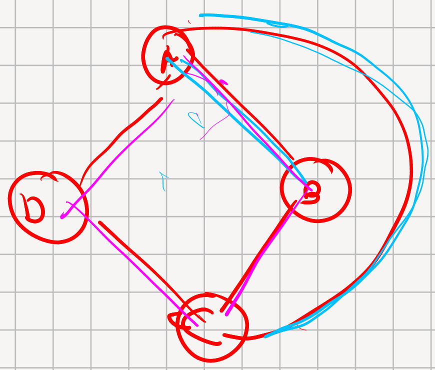


Conectividad

Conexo: Que existe un camino desde un vertice v hasta un vertices u
Camino: Secuencia de aristas continuas
Camino SIMPLE: Es un camino QUE NO REPITE ARISTAS
Circuito: Es un camino que inicia y termina en el mismo vertice.
Circuito SIMPLE: Es un circuito QUE NO REPITE ARISTAS

$1+1=1$

$$\begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 2 \\ 1 & 0 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$



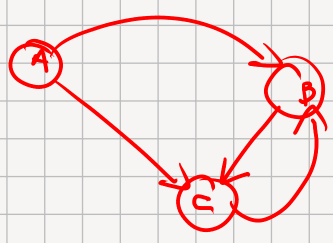
$$\begin{array}{c c} & \begin{array}{cccc} A & B & C & D \end{array} \\ \begin{array}{c} A \\ B \\ C \\ D \end{array} & \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

$$M_R^2 = \begin{bmatrix} 3 & 1 & 2 \\ & & \\ & & \end{bmatrix}$$

$$M_R^n = \begin{bmatrix} & & \\ & & \end{bmatrix}$$

$$W^0 = M_R^0$$

$$W_{ij}^{(k)} = \left\{ W_{ij}^{k-1} \vee \left( W_{kj}^{k-1} \wedge W_{ik}^{k-1} \right) \right.$$



$W^0$

$$\begin{array}{c|ccc} & A & B & C \\ \hline A & 0 & 1 & 1 \\ B & 0 & 0 & 1 \\ C & 0 & 1 & 0 \end{array}$$

$W_{11}^{1} = W_{11}^{0} \vee (W_{11}^{0} \wedge W_{11}^{0})$

$kj \quad ik$

$W_1$

$$\begin{bmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ & & \end{bmatrix}$$

$W_{23}^{1} = W_{23}^{0} \vee (W_{13}^{0} \wedge W_{21}^{0})$

$1 \vee (1 \wedge 0)$

$W_{12}^{1} = W_{12}^{0} \vee (W_{12}^{0} \wedge W_{11}^{0})$

$1 \vee$

$W_{13}^{1} = W_{13}^{0} \vee (W_{13}^{0} \wedge W_{11})$

$W_{21}^{1} = W_{21}^{0} \vee (\cancel{W_{11}^{0}} \wedge W_{21}^{0})$

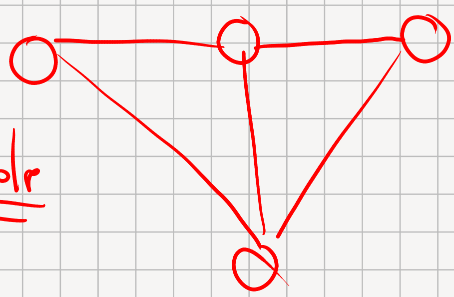
$0$

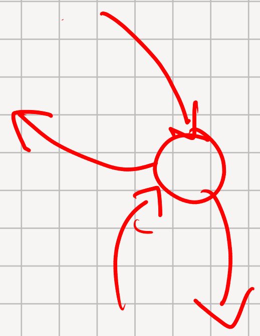
$W_{22}^{1} = W_{22}^{0} \vee (W_{12}^{0} \wedge W_{21}^{0})$

$0 \vee (1 \wedge 0)$

# Euler

Simple



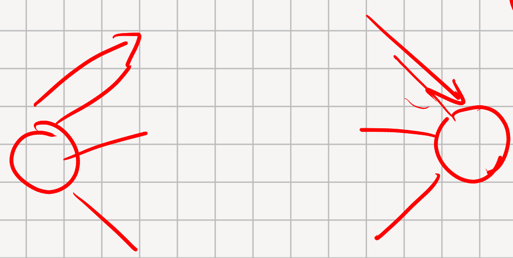


Circuito

1) Conexo y grado par

2) Camino Euleriano

2 impar resto de grado par



# Hamilton