

Tarea: Terminar programa presa-depredador avanzado por lo menos la parte de que huyan o se sienten las presas.

¿cuál es el # máximo de aristas que puede tener una gráfica no-dirigida con  $n$  nodos?

$G(V, E)$

$V = \{0\}$   $E = \{\}$

$V = \{0, 1\}$   $E = \{(0, 1)\}$

|     |                    |    |
|-----|--------------------|----|
| $E$ | $\textcircled{01}$ | 20 |
|     | 02                 | 21 |
|     | 03                 | 23 |
|     | $\textcircled{10}$ | 30 |
|     | 12                 | 31 |
|     | 13                 | 32 |

| gráfica | # max aristas |
|---------|---------------|
|         | 0             |
|         | 1             |
|         | 3             |
|         | 6             |
|         | 10            |

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

$$\frac{5 \cdot 4}{2} = 10$$

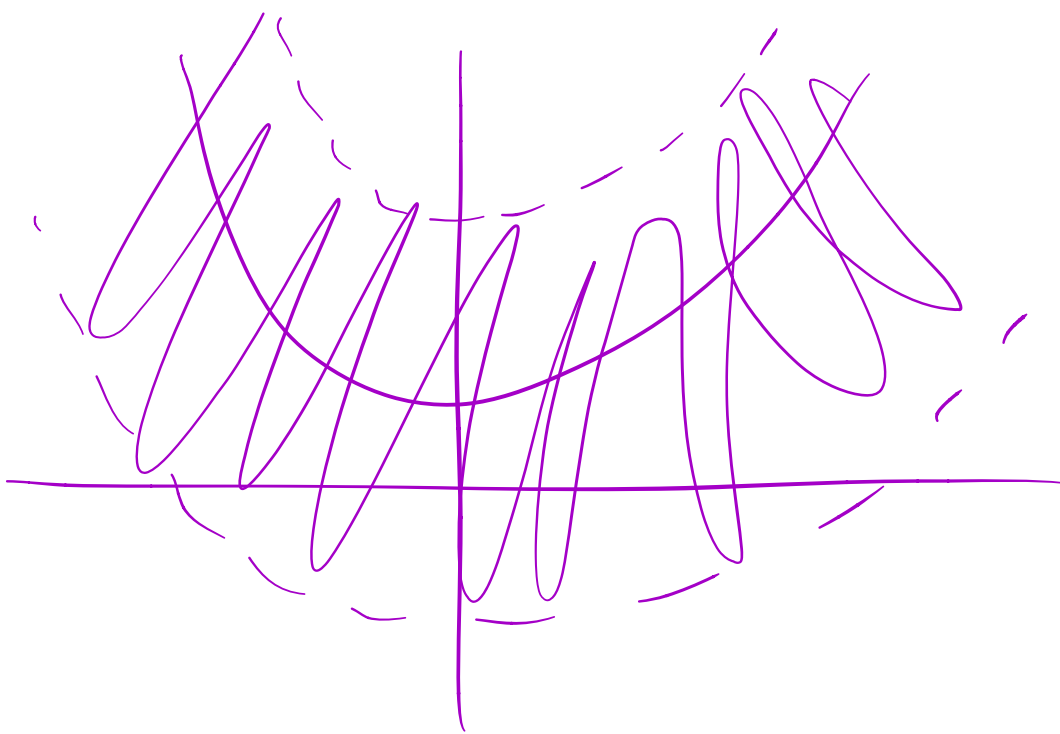
$$\frac{n(n-1)}{2} = \boxed{\frac{n^2}{2} - \frac{n}{2}}$$

$$\sim \textcircled{n^2}$$

$\sim n$

$\sim \log n$

$\sim n^3$

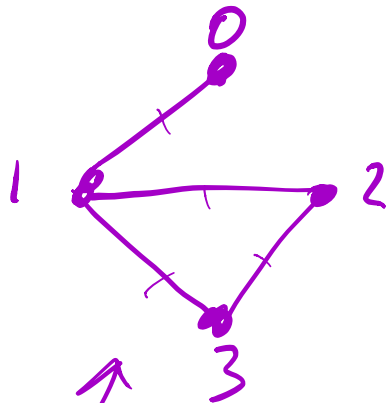


$$|V| = n \quad \# \text{ de nodos}$$

$$|E| = m \quad \# \text{ de aristas}$$

$$m \sim n^\alpha \quad \alpha < 2 \quad \rightarrow \text{rala}$$

$$m \sim n^2 \quad \rightarrow \text{densa}$$



$A =$

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

grafo

$$\begin{aligned} n &= 4 \\ m &= 4 \end{aligned}$$

|   | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 2 | 0 | 1 | 0 | 1 |
| 3 | 0 | 1 | 1 | 0 |

$$4 \sim 4'$$

$$|E| \sim |V|'$$

Grafo completa con 100 nodes

$$n = 100$$

$$m = 4950$$

$$m \propto n$$

$$m \sim n^2$$

10000

denso

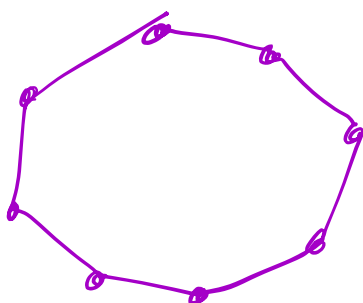
Grafo completa con  $n$  nodes

$$m \sim n^2$$

$$m = \frac{n^2 - n}{2} \sim n^2$$

denso

Grafo ciclica con  $n$  nodes



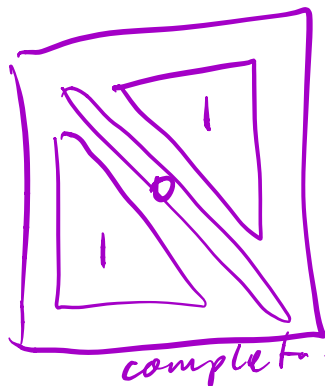
$$|V| = n$$

$$|E| = n$$

$$|E| \sim |V|'$$

sparsa

gala



$\leftarrow P(0)$  es pequeña

Rala

|   |   |   |   |   |
|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 |   |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 |

$\leftarrow$  pocos unos

$P(1)$  es pequeña

densa

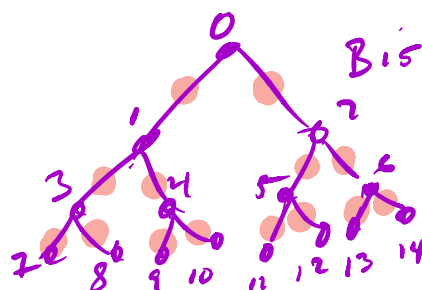
|   |   |   |   |
|---|---|---|---|
| 1 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 |

$\leftarrow$  muchos unos

$P(1) \sim 50\%$

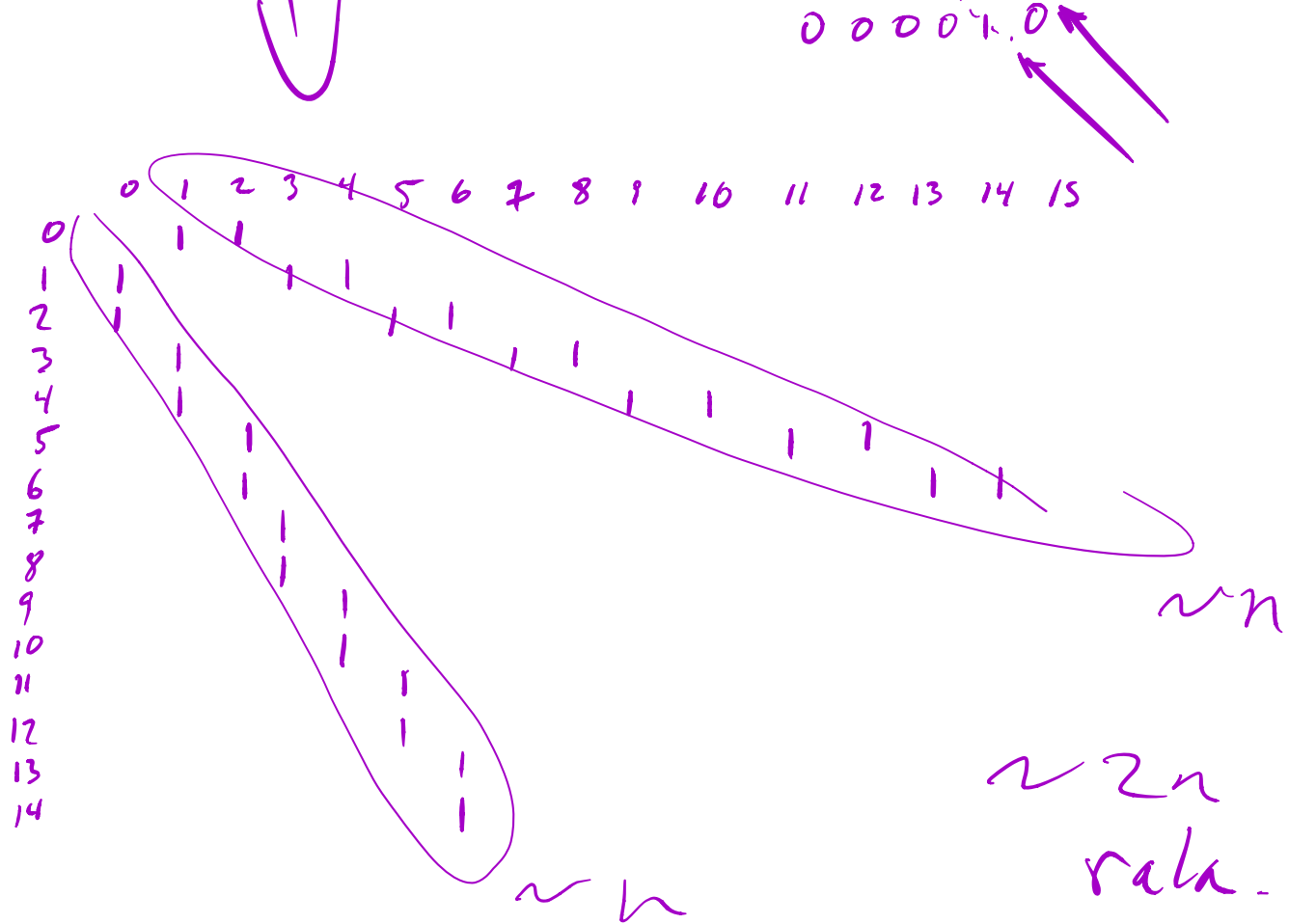


|   | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 2 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 0 |



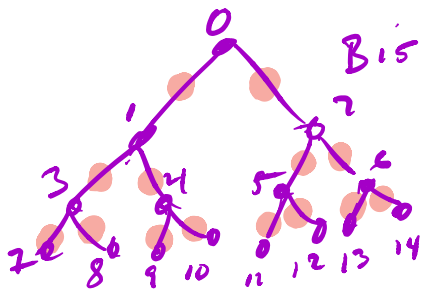
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 | 0 | 1 |

$2n \sim n$   
gala



Listas de adyacencia

(para gráficas raras)



0: 1, 2

7: 3

1: 0, 3, 4

8: 3

2: 0, 5, 6

9: 4

3: 1, 7, 8

10: 4

4: 1, 9, 10

11: 5

5: 2, 11, 12

12: 5

6: 2, 13, 14

13: 6

14: 6

$L_6$



0:1

1:0,2

2:1,3

3:2,4

4:3,5

5:4

