Grafos

Fundamentos

Prof. Edson Alves

Faculdade UnB Gama

Por que estudar grafos?

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- **Os grafos abstraem todas as outras estruturas de dados**

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- ⋆ **Grafos modelam muitos problemas reais**

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- Travessias em grafos são eficientes e úteis

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- ⋆ Os grafos abstraem todas as outras estruturas de dados
- ⋆ Grafos modelam muitos problemas reais
- ⋆ Travessias em grafos são eficientes e úteis
- ⋆ Algoritmos clássicos resolvem problemas recorrentes

Grafo

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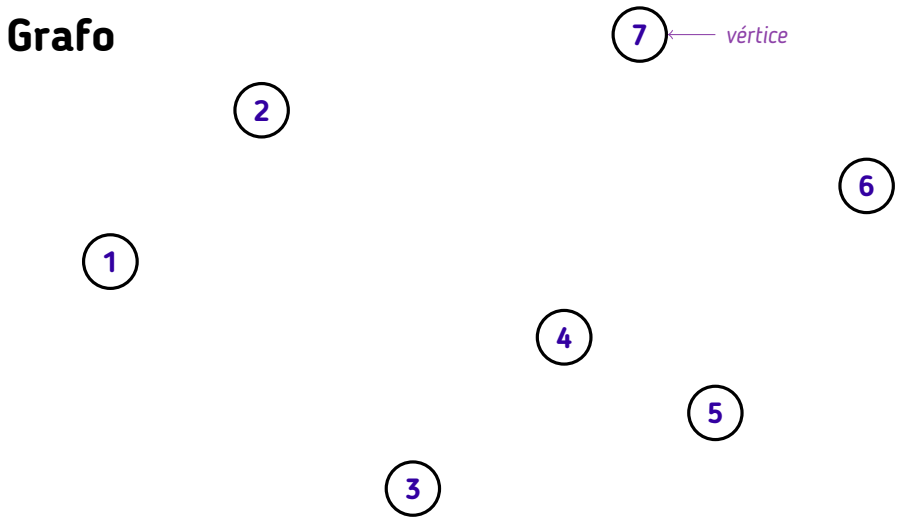

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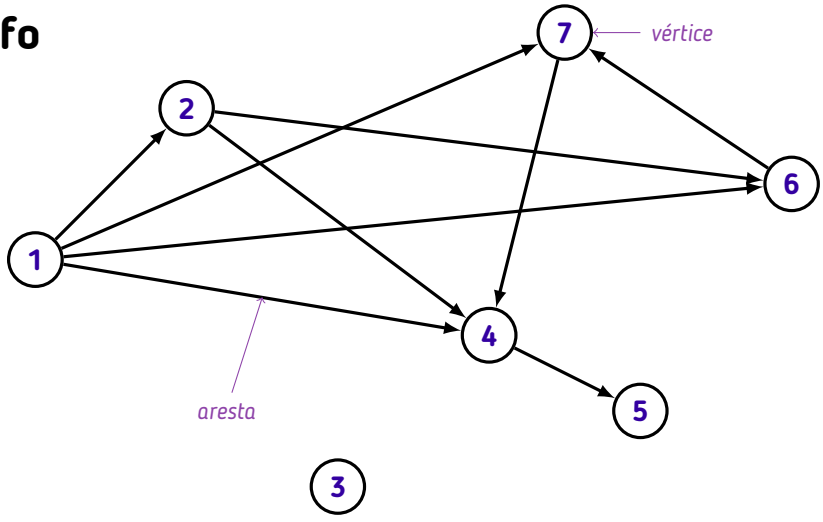

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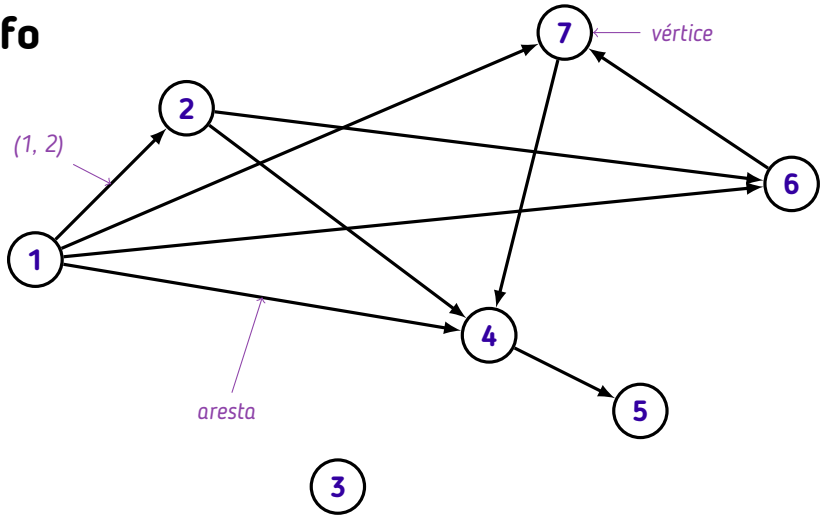

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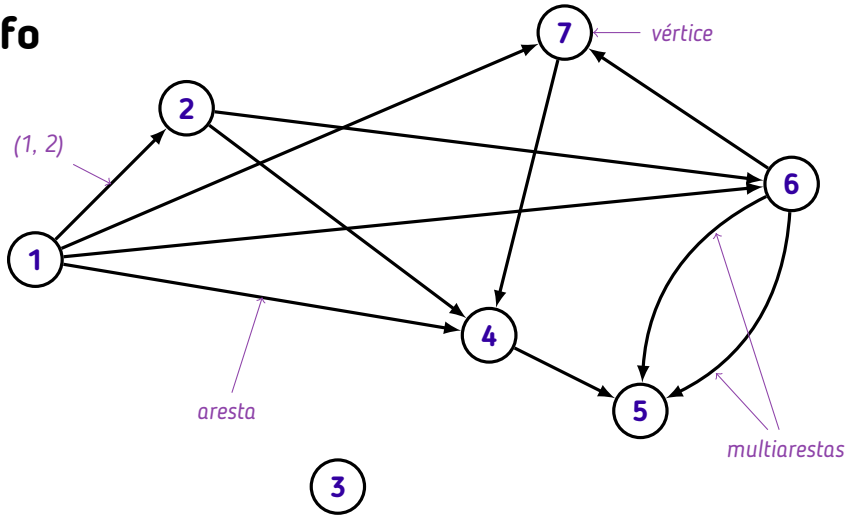

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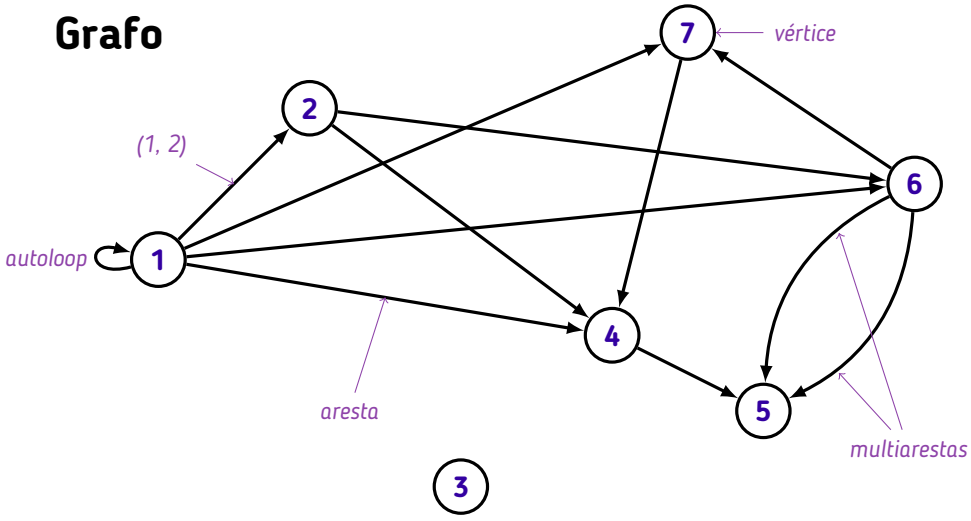

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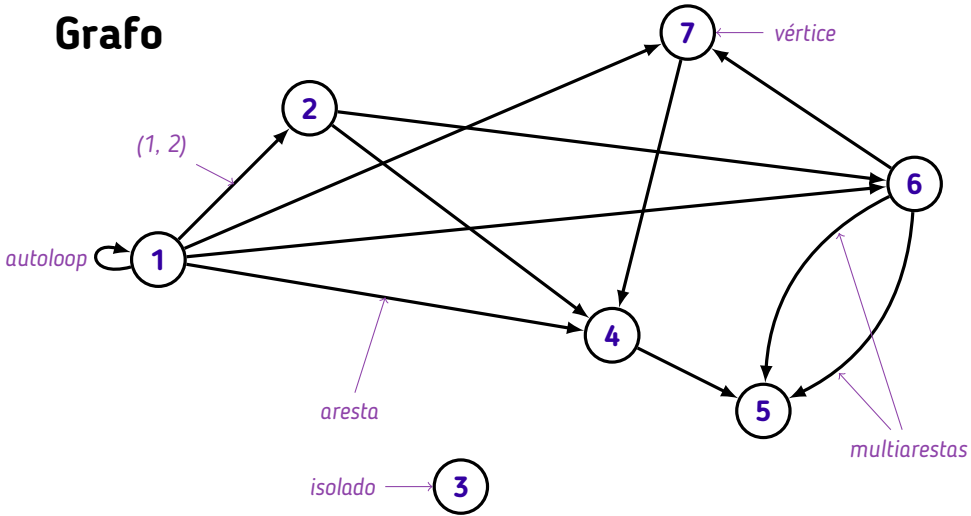
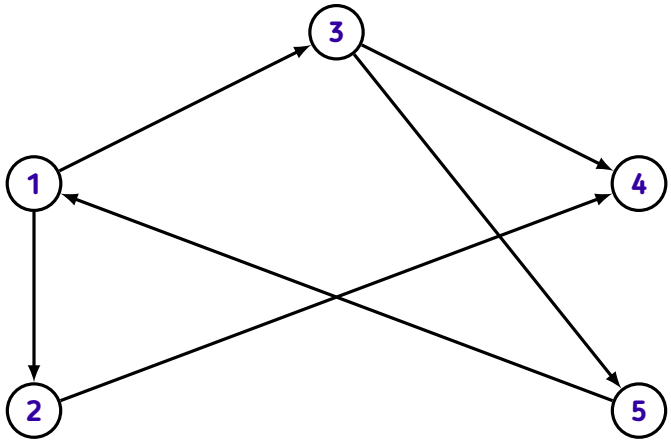


Grafo simples



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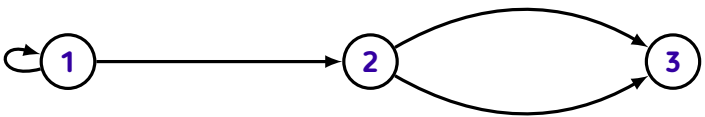

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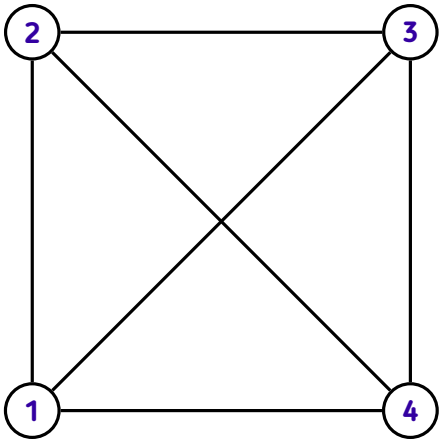
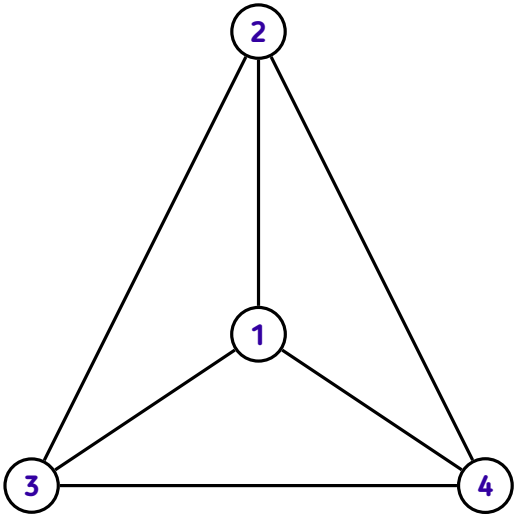
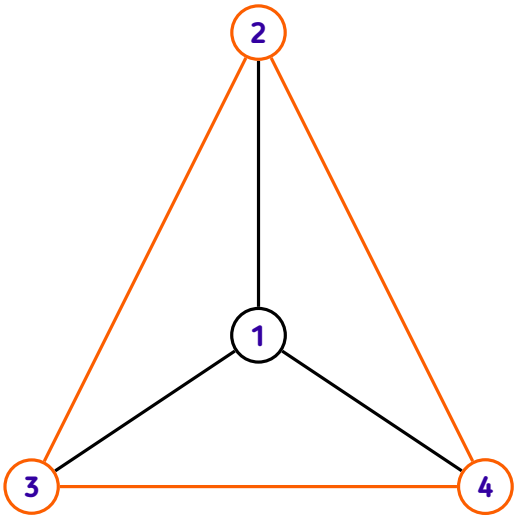


Subgrafo



Subgrafo



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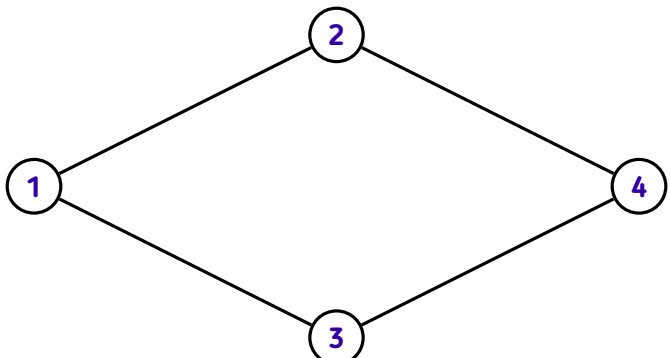

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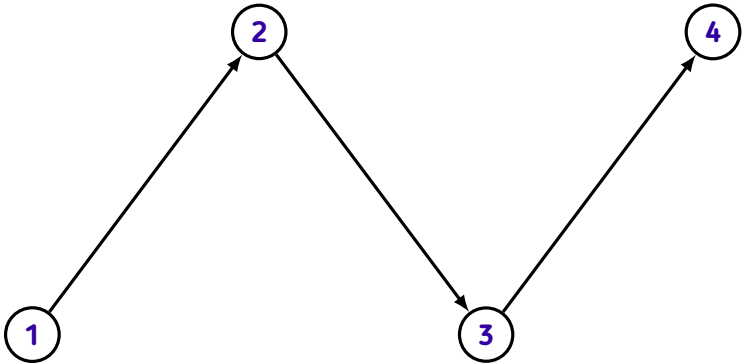
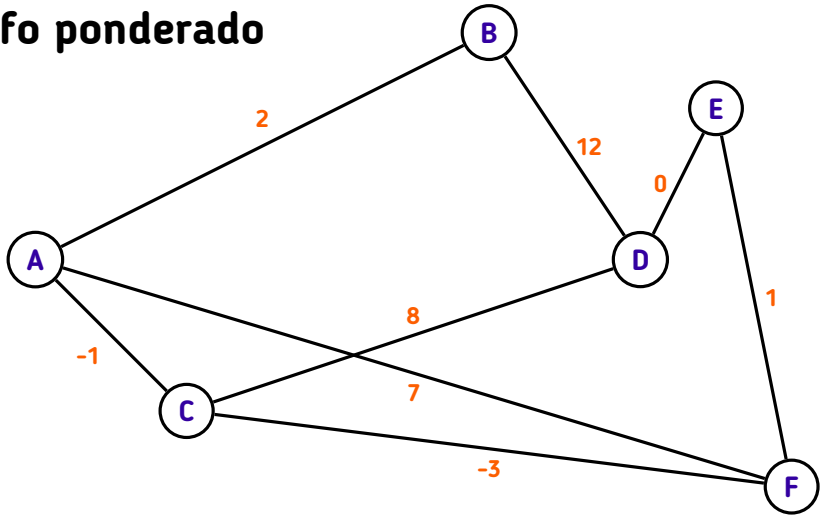


Grafo ponderado



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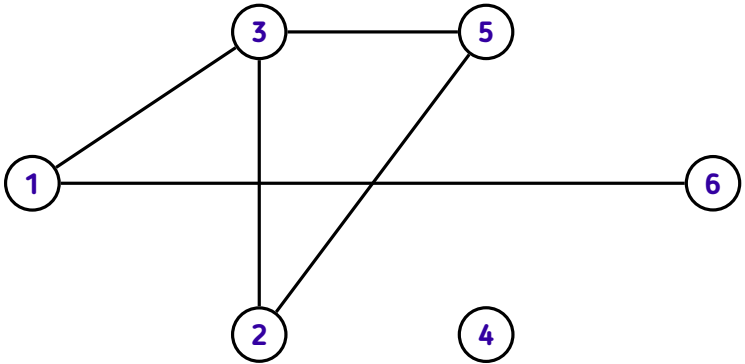
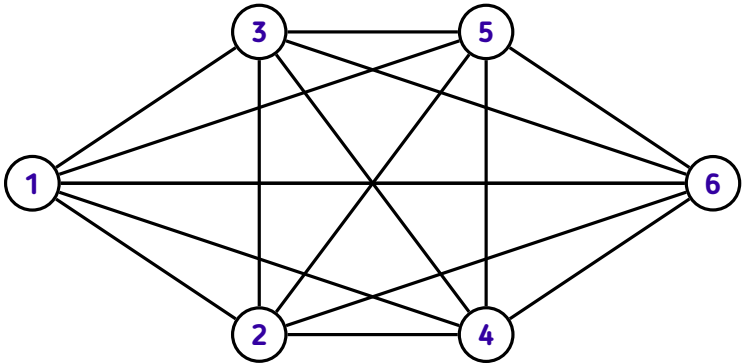


Grafo denso



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- ⋆ **Grau de entrada $g_i(u)$: # vértices que chegam em u**

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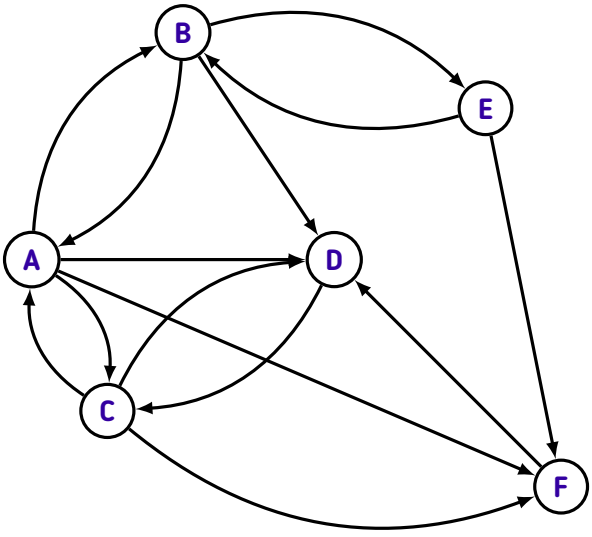
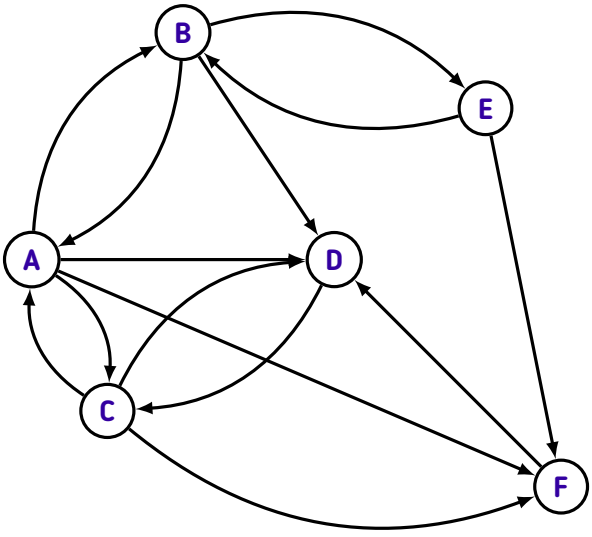
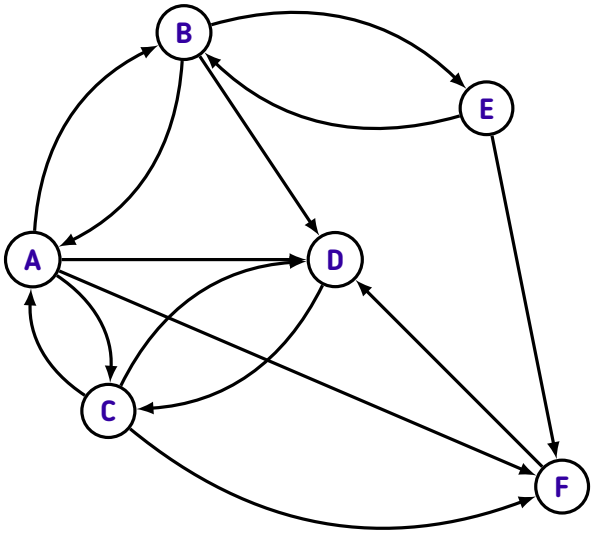
- ⋆ **Se G é não-direcionado, então $g_i(u) = g_o(u)$, $\forall u \in V$**



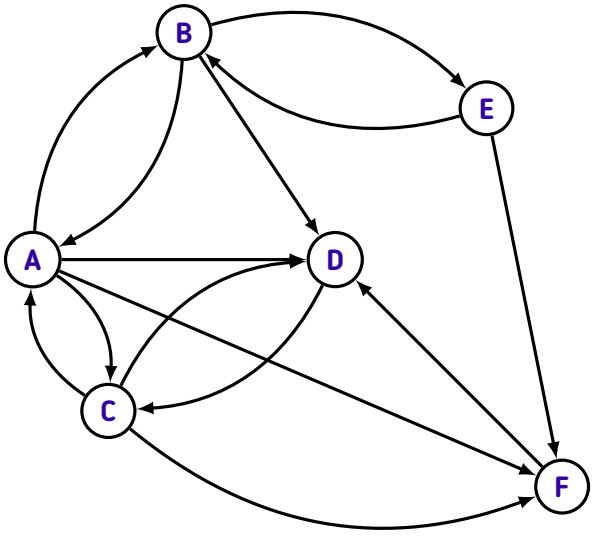
u	$g_i(u)$	$g_o(u)$



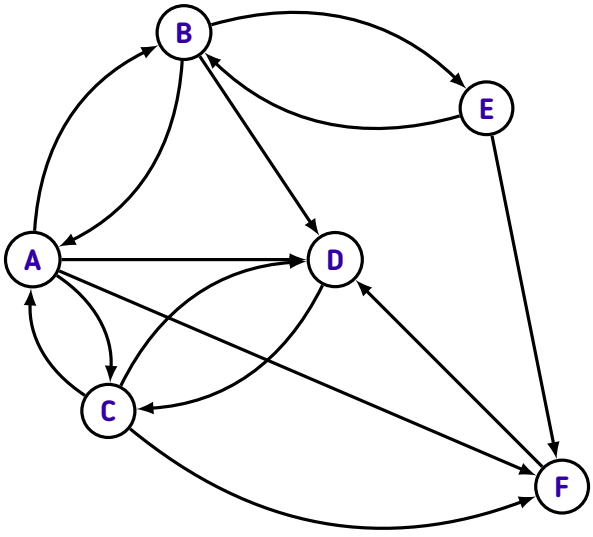
u	$g_i(u)$	$g_o(u)$
A	2	4



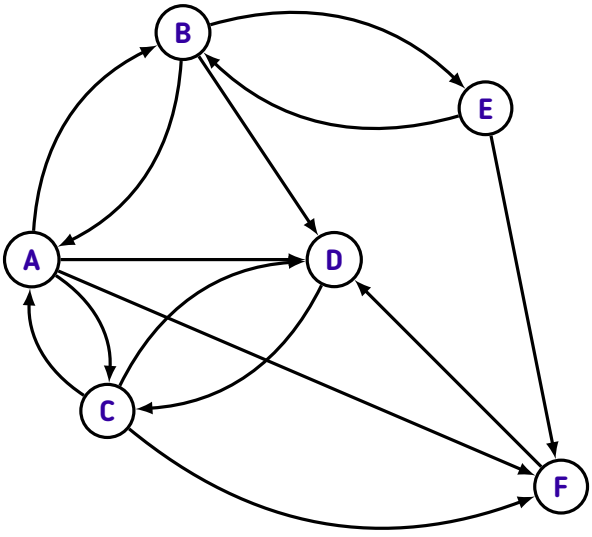
u	$g_i(u)$	$g_o(u)$
A	2	4
B	2	3



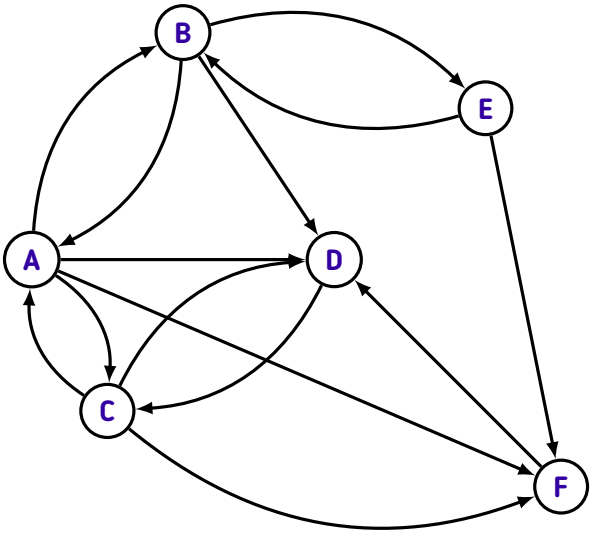
u	$g_i(u)$	$g_o(u)$
A	2	4
B	2	3
C	2	3



u	$g_i(u)$	$g_o(u)$
A	2	4
B	2	3
C	2	3
D	4	1



u	$g_i(u)$	$g_o(u)$
A	2	4
B	2	3
C	2	3
D	4	1
E	1	2



u	$g_i(u)$	$g_o(u)$
A	2	4
B	2	3
C	2	3
D	4	1
E	1	2
F	3	1

Caminhos

Um caminho é uma sequência não-nula de vértices da forma

$$(u, w_1), (w_1, w_2), (w_2, w_3), \ldots, (w_{n-1}, w_n), (w_n, v)$$

onde u é o ponto de partida e v o ponto de chegada

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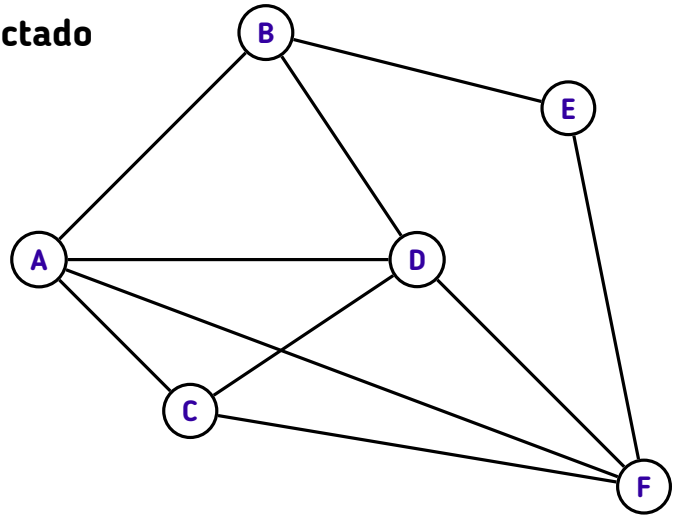

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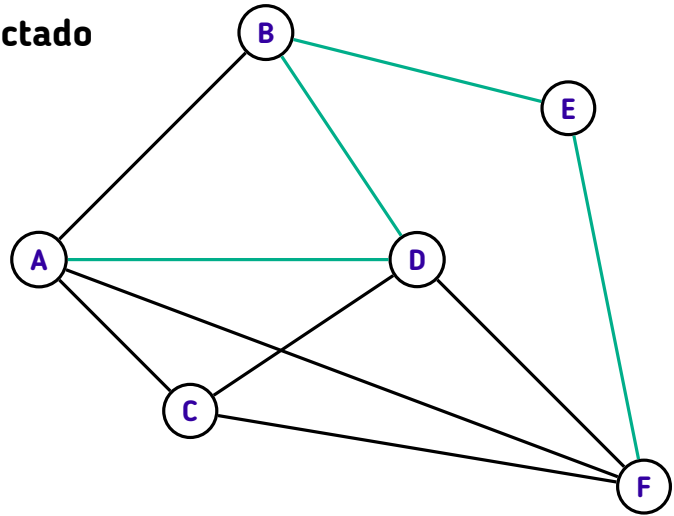

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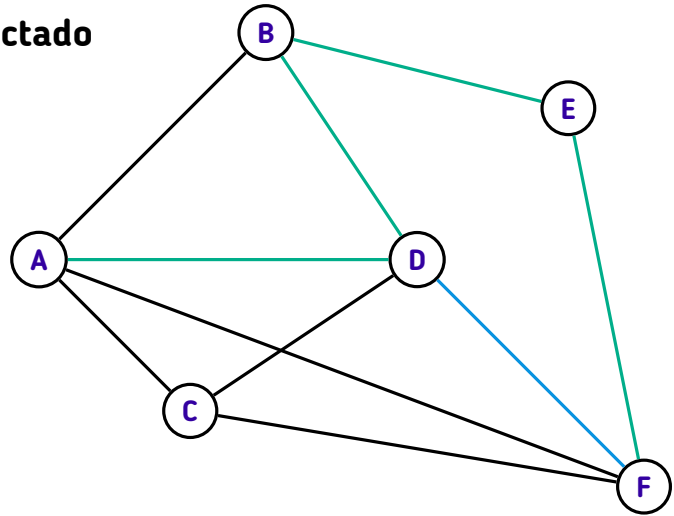

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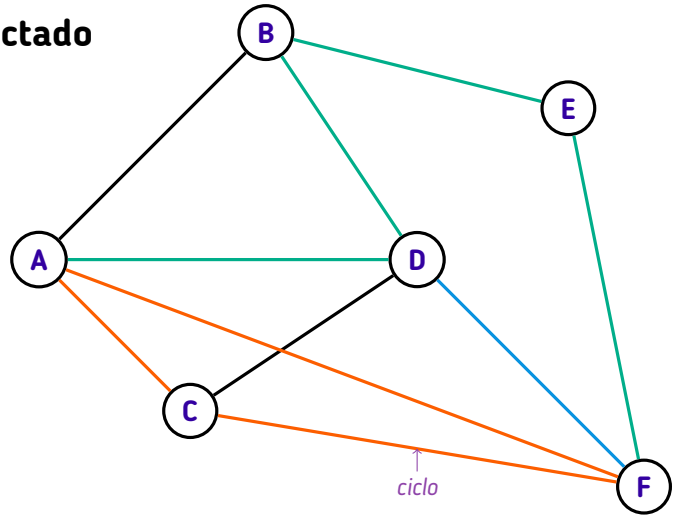

Referências

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2. **LAAKSONEN**, **Antti**. ***Competitive Programmer's Handbook*, 2018.**

3. **SKIENA**, **Steven**; **REVILLA**, **Miguel**. ***Programming Challenges*, 2003.**