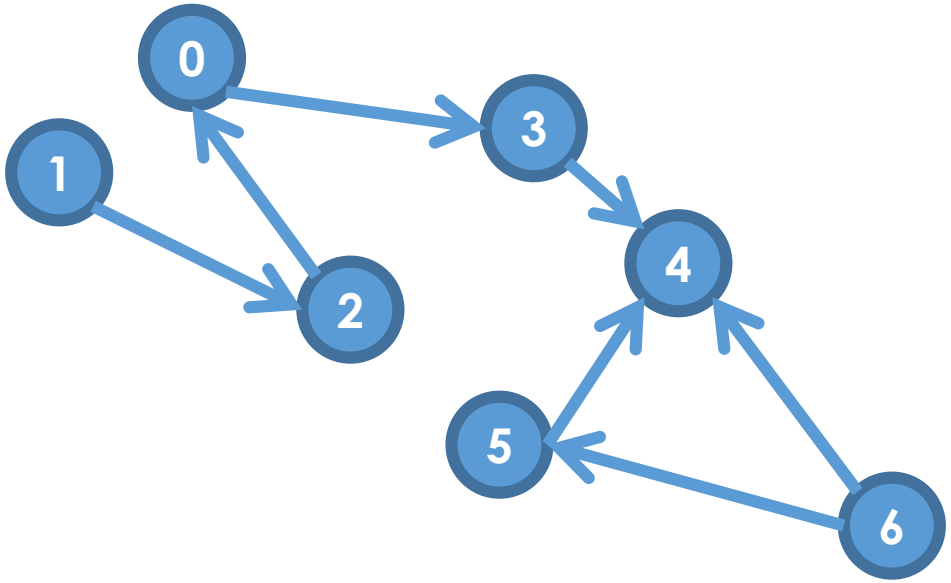
Graph Representations

Concept Challenge: Procedure

- **Pause** Try to solve the problem yourself
- **Discuss** with other learners (if you can)
- **Watch** the UC San Diego learners video
- **Answer** the question again
- **Confirm** your understanding with our explanation



How much storage is required to represent a graph as a matrix? (Big-O, Tightest Bound)

A. $|V|$
B. $|E|$
C. $|V| + |E|$
D. $|V|^2$
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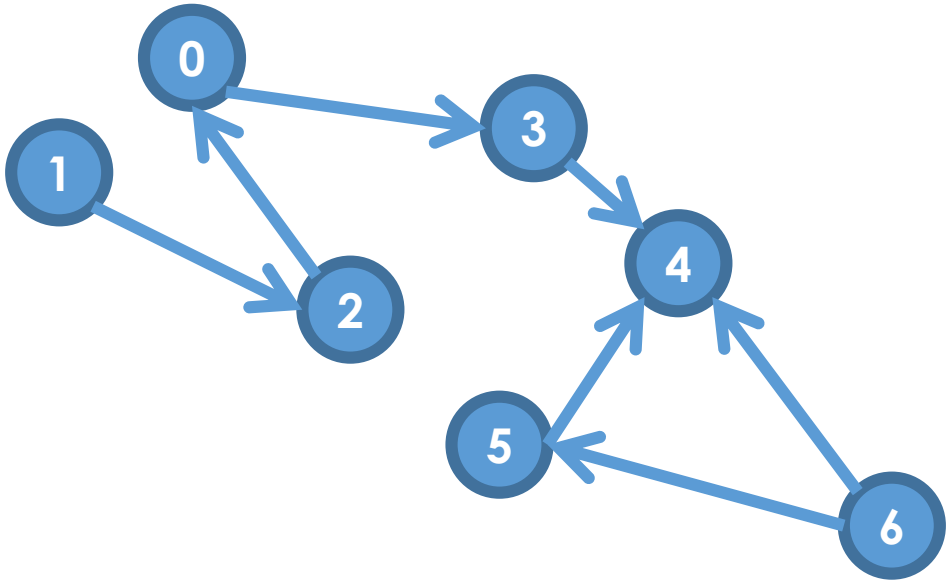
Warmup Question



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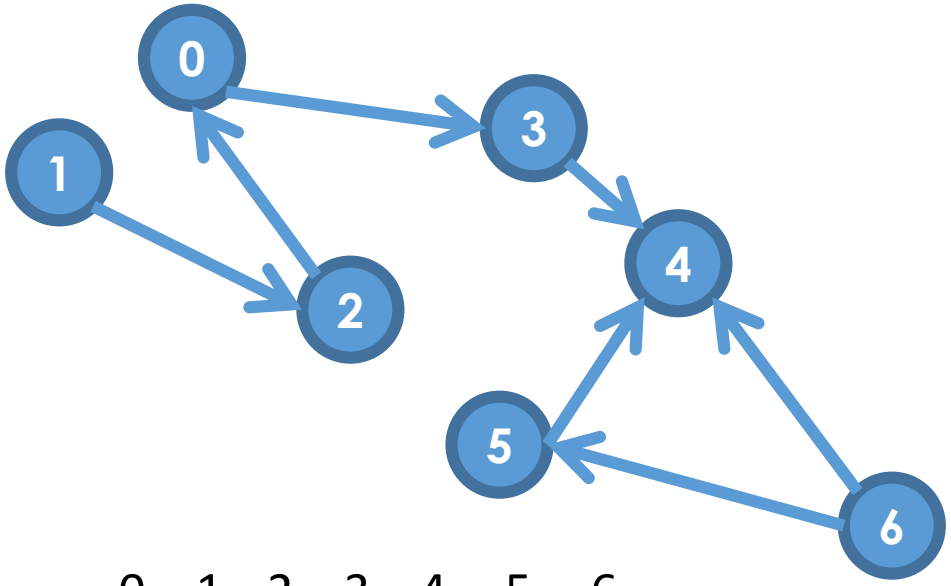

	0	1	2	3	4	5	6
0				1			
1			1				
2	1						
3					1		
4							
5					1		
6					1	1	

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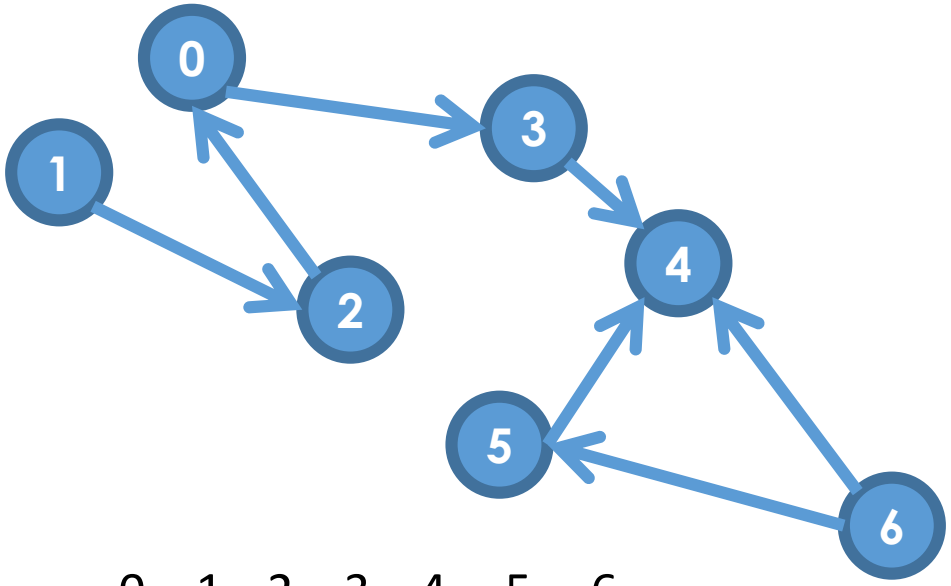

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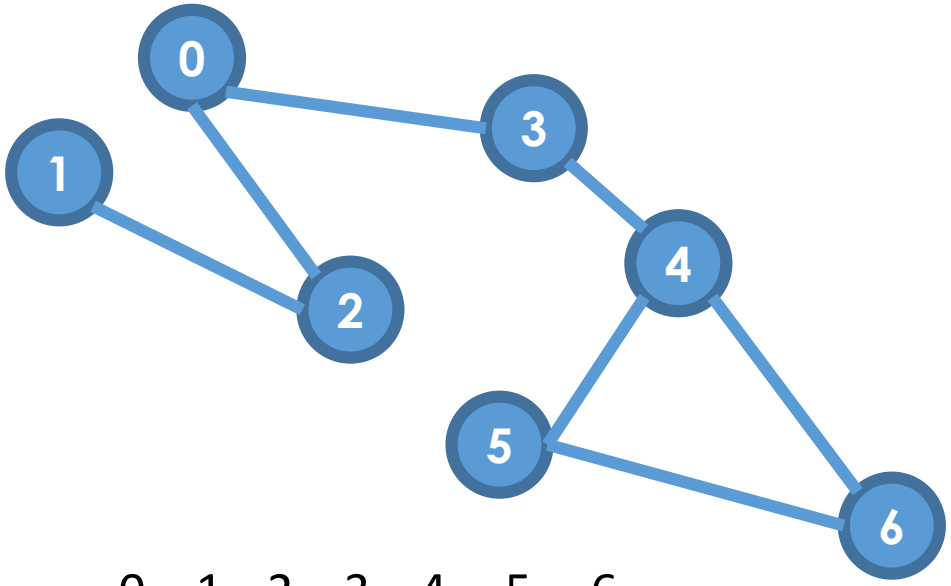

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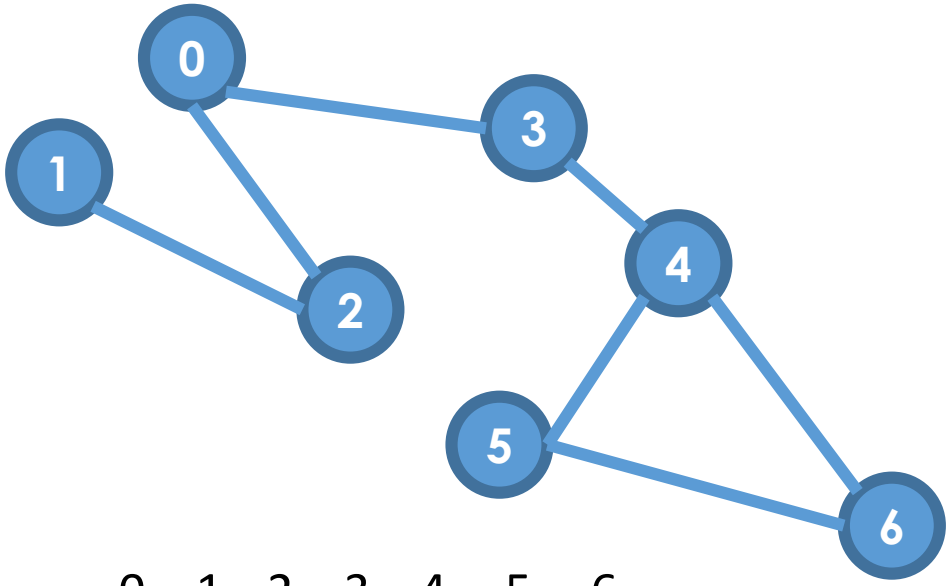
What would change if undirected?



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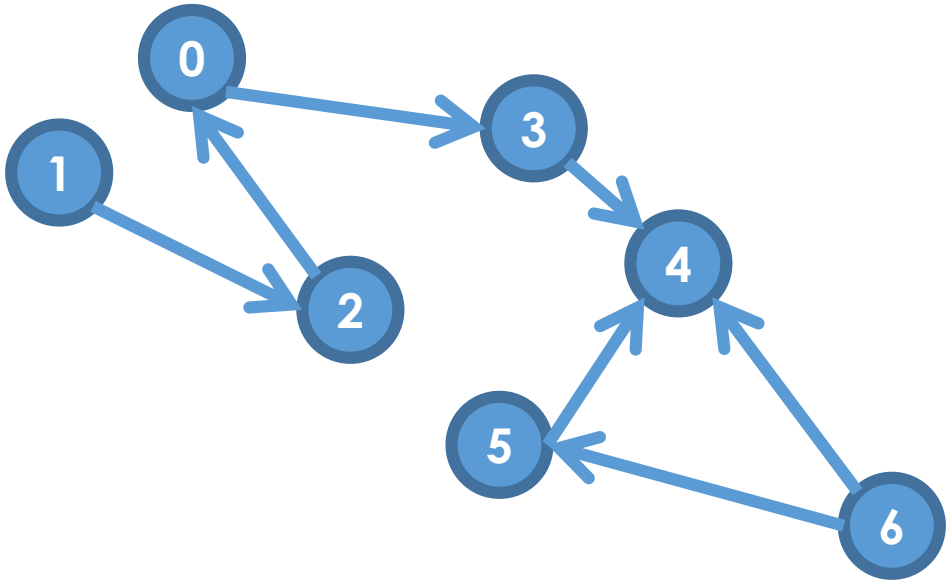
What would change if undirected?

Half is redundant, but still $O(|V|^2)$



How much storage is required to represent a graph as an **adjacency list**? (Big-O, Tightest Bound)

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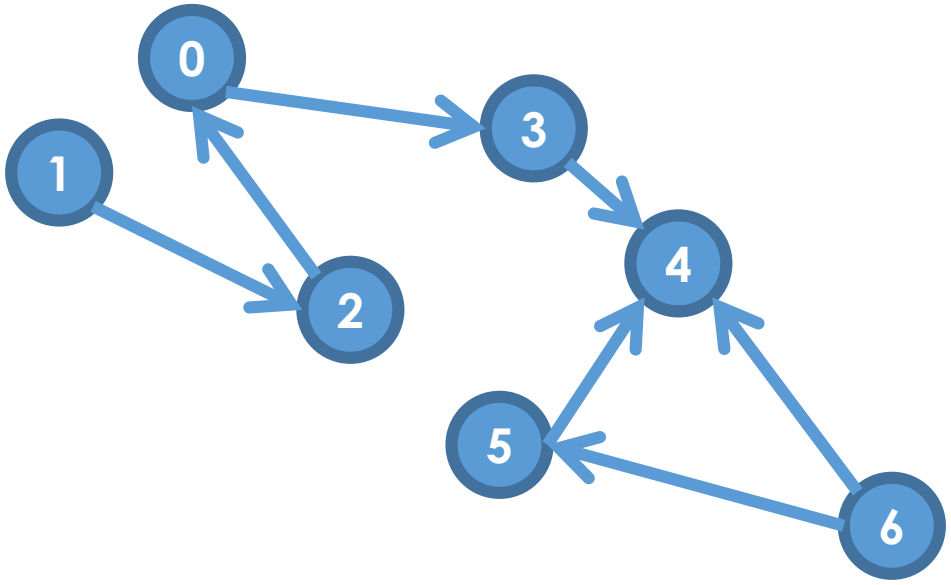

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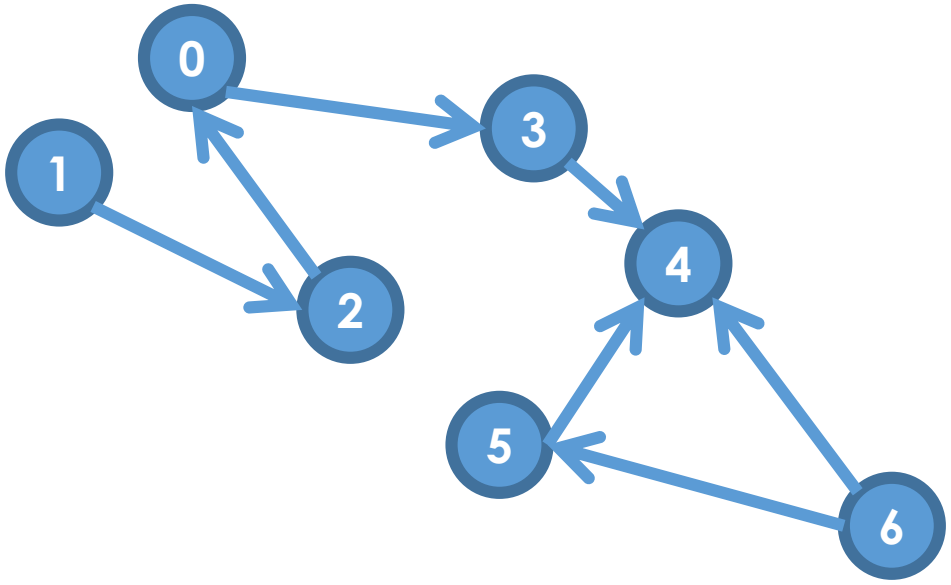

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5 → { 4 }
6 → { 4, 5 }

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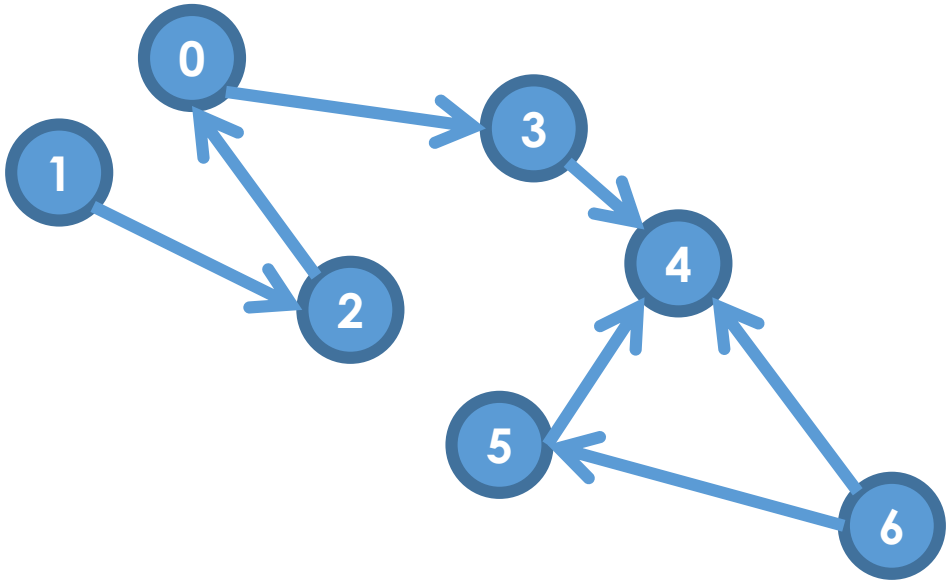

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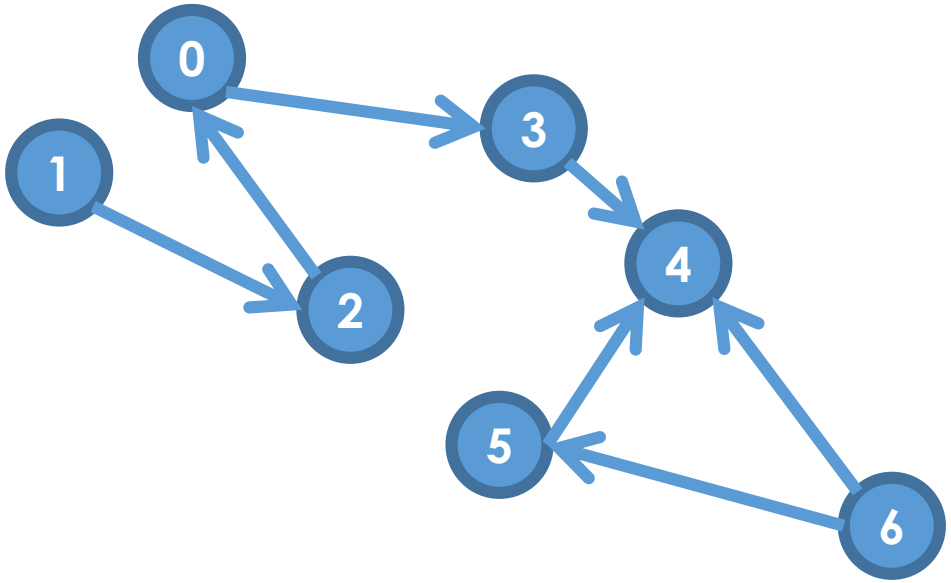

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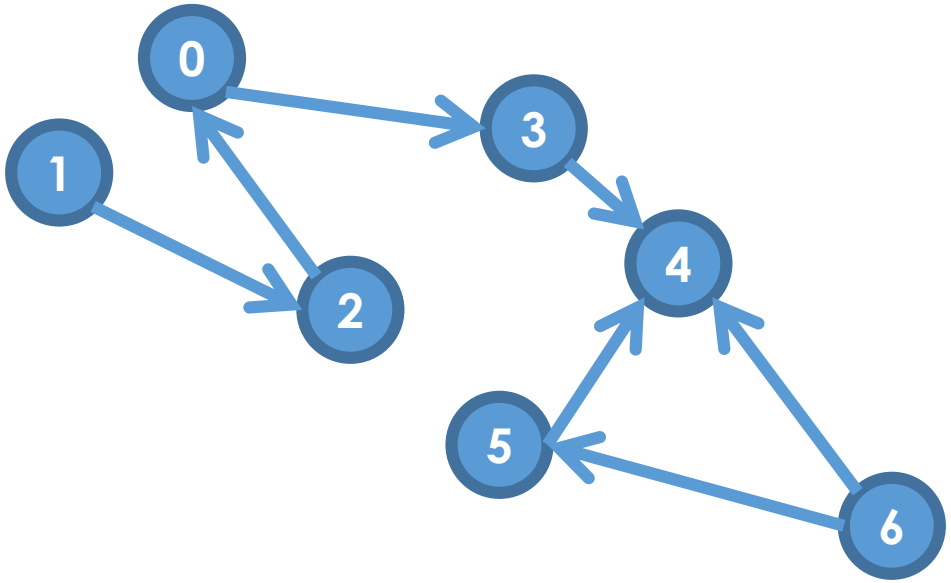

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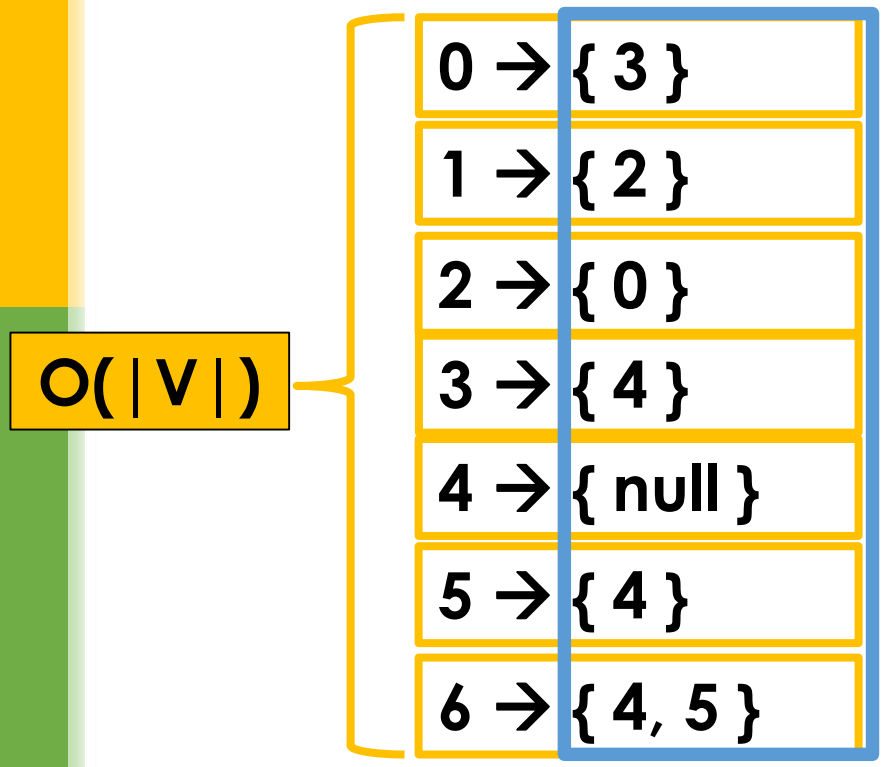

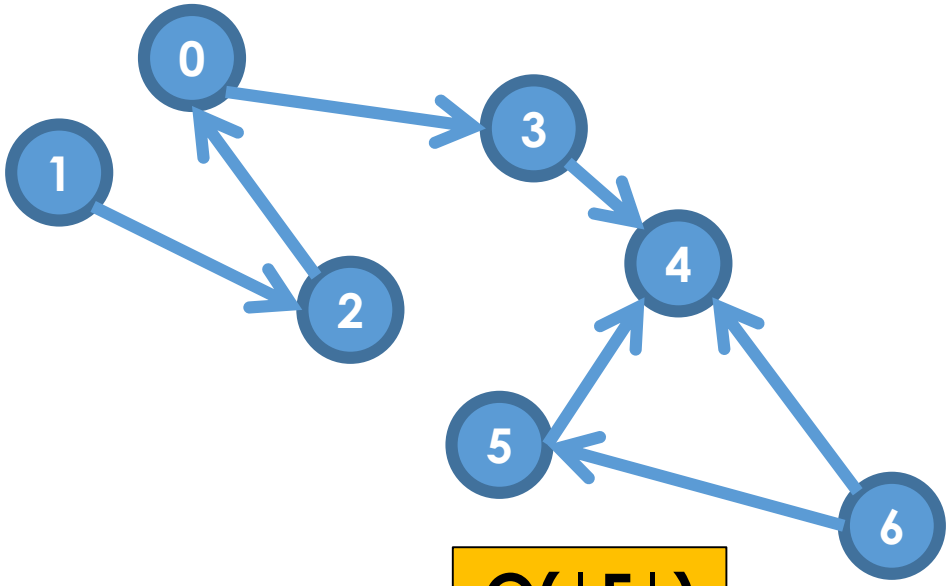

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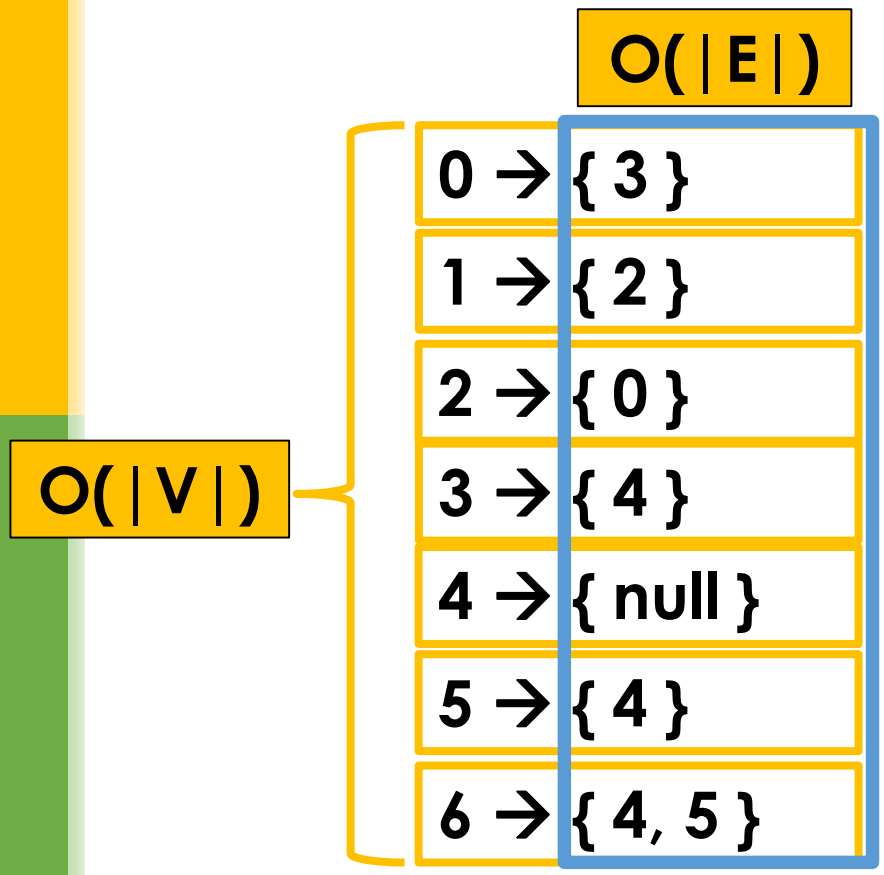

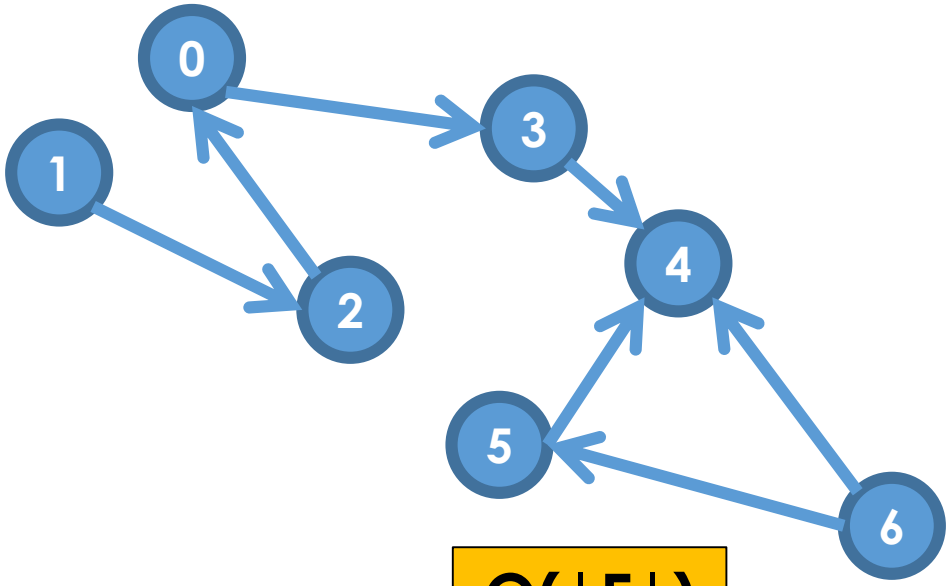

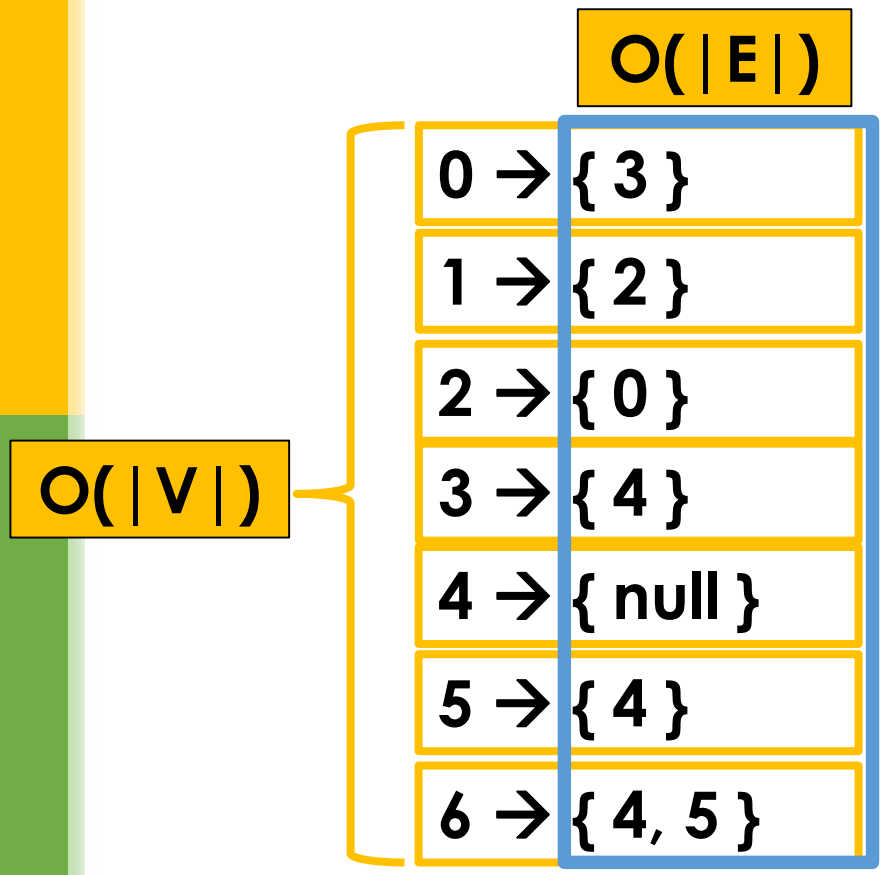

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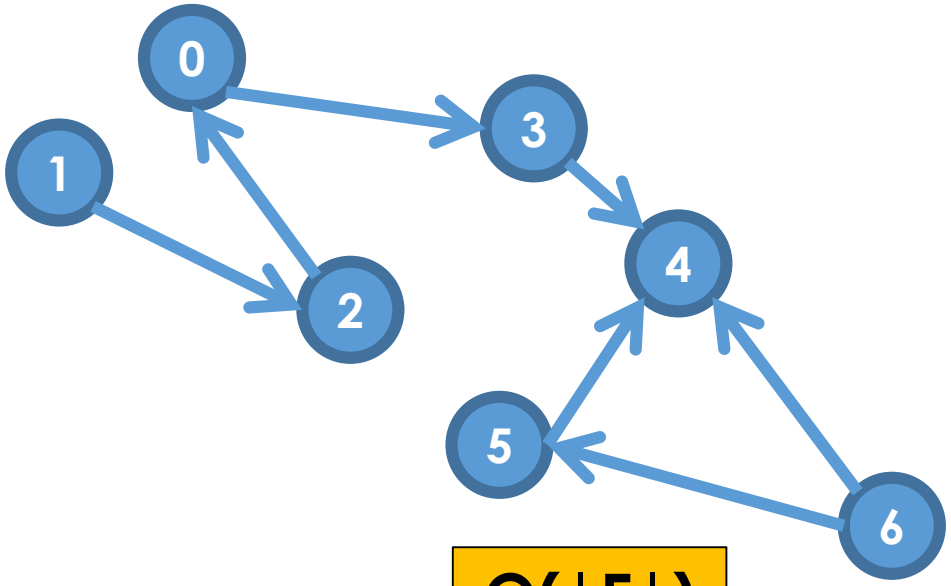

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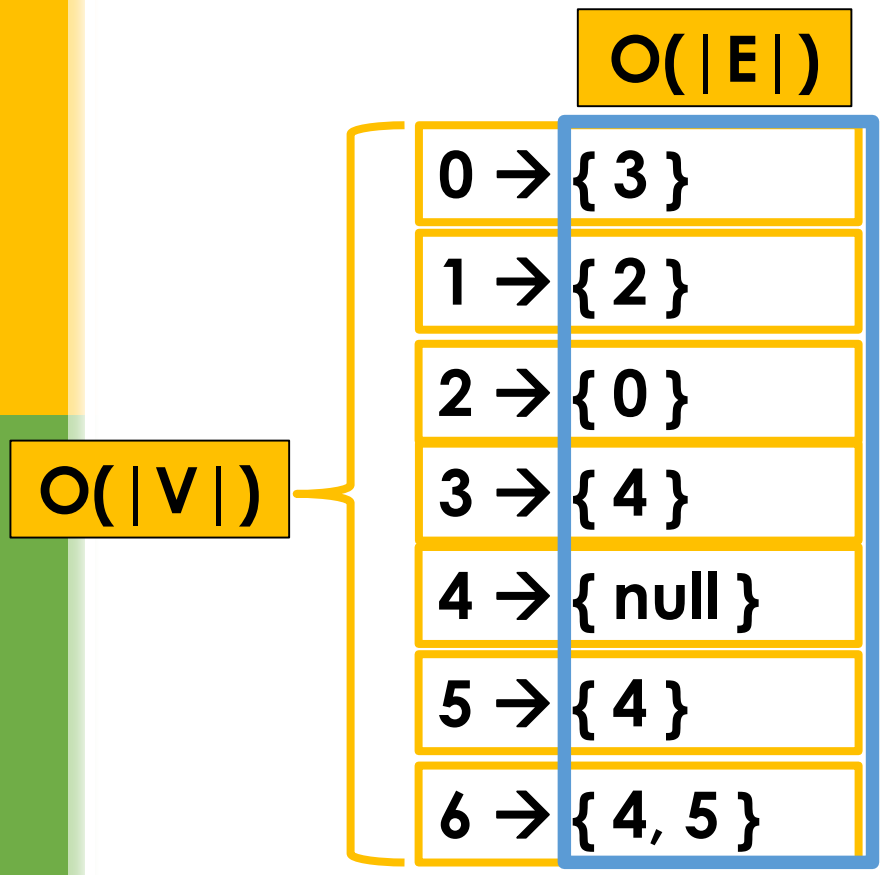
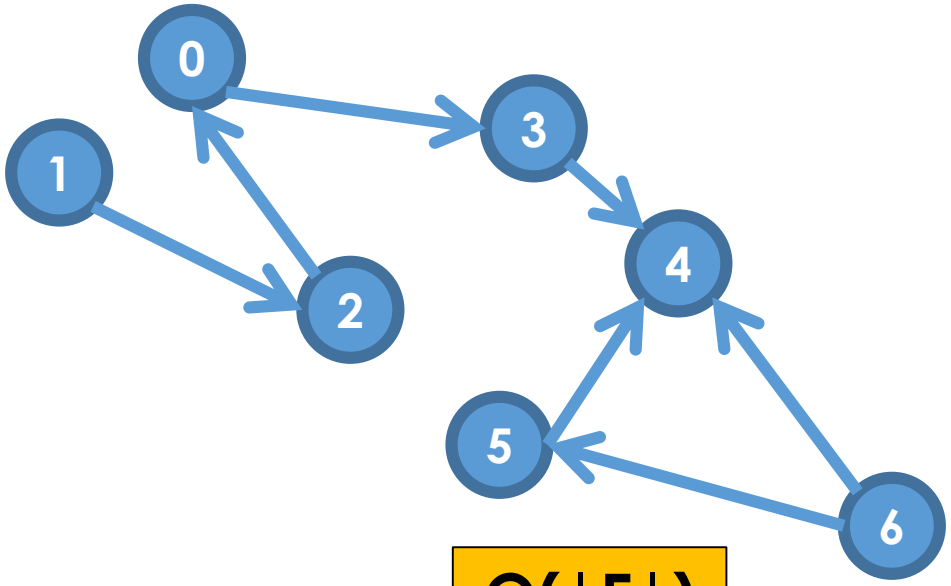
Much more efficient for sparse graphs!





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For dense graphs with lots of edges, $|E|$ will be as large as $|V|^2$