

Objectives

Basic Graphs

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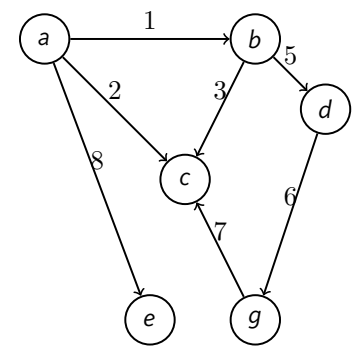
The three graph representations you will want to know are

- ▶ adjacency matrix
- ▶ adjacency list
- ▶ edge list



Graph Vocabulary

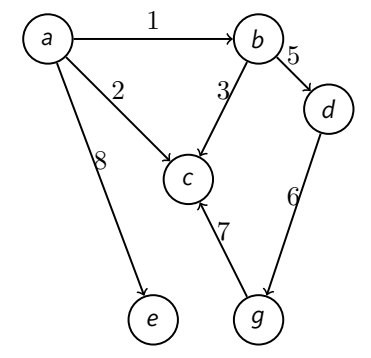
- ▶ node/vertex, edge
- ▶ loop
- ▶ multigraph
- ▶ path
- ▶ connected
- ▶ simple
- ▶ directed / undirected
- ▶ weighted / unweighted



Adjacency Matrix

- ▶ Memory $\mathcal{O}(V^2)$
- ▶ $\mathcal{O}(1)$ vertex access.
- ▶ For dense graphs.

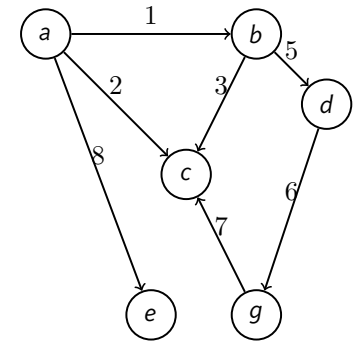
	a	b	c	d	e	g
a	1	2			8	
b			3	5		
c						
d						
e						6
g			7			



Adjacency List

- ▶ Memory $\mathcal{O}(V + E)$
- ▶ $\mathcal{O}(1)$ vertex access.
- ▶ A good "default" implementation.
- ▶ Speed drill!

a	1 2 8
b	3 5
c	
d	6
e	
g	7



Edge List

- ▶ Memory $\mathcal{O}(E)$
- ▶ Best for MST — sort by edges weights.

- (8,a,e)
- (7,g,c)
- (6,d,g)
- (5,b,d)
- (3,b,c)
- (2,a,c)
- (1,a,b)

