Basic Graphs

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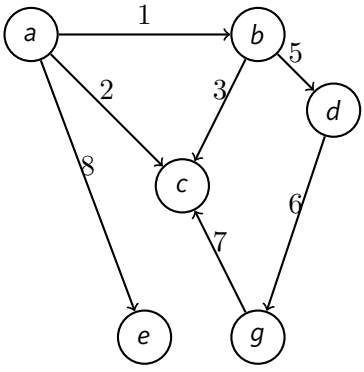
Objectives

The three graph representations you will want to know are

- adjacency matrix
- adjacency list
- edge list

Graph Vocabulary

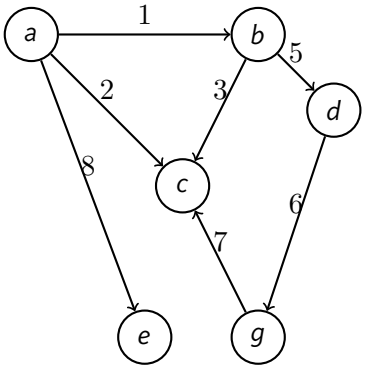
- node/vertex, edge
- loop
- multigraph
- path
- connected
- simple
- directed / undirected
- weighted / unweighted



Adjacency Matrix

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

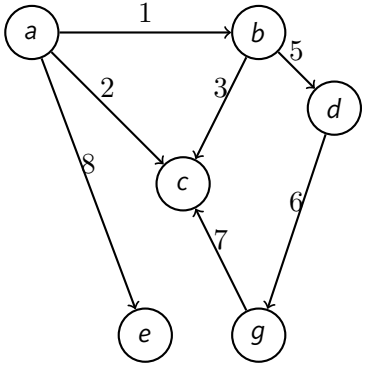
	a	b	c	d	e	g
a	1	2			8	
b			3	5		
c						
d						6
e						
g			7			



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)