

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Mathematics for Computer Science
 MIT 6.042J/18.062J

Simple Graphs: Connectivity



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connect.1

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Connected Vertices

two vertices are
connected iff
 there is a **path**
 between them



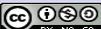
Albert R Meyer, April 5, 2013

connect.2

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Connected Graphs

A **graph is connected**
 iff all its vertices
 are connected to
 each to other



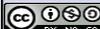
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connect.3

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Connected Components

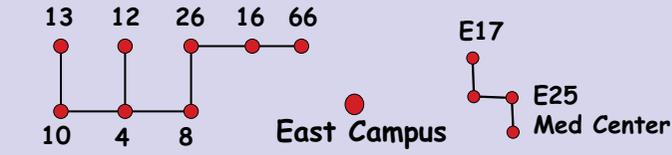
Every graph consists of
 separate connected
 pieces (subgraphs) called
connected components



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connect.4


Connected Components



Infinite corridor

3 connected components

the more connected components,
the more "broken up" the graph is.


 Albert R Meyer, April 5, 2013 connect.5


Connected Components

The **connected component**
of vertex $v ::=$

$$\{w \mid v \text{ and } w \text{ are connected}\}$$

$$= \underbrace{E^*}_{\text{walk relation}}(v)$$


 Albert R Meyer, April 5, 2013 connect.6


Connected Components

So a graph is **connected**
iff it has only
1 connected component


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