Math 154: Discrete Mathematics and Graph Theory

Professor: Daniel Kane
dakane@ucsd.edu

Course webpage:
http://cseweb.ucsd.edu/~dakane/Math154/

Lecture Zoom Meeting Link:
https://ucsd.zoom.us/my/dankane

Basic Logistical Information

Course Technology Guide:

http://cseweb.ucsd.edu/~dakane/Math154/Technology.pdf

Course Syllabus:

http://cseweb.ucsd.edu/~dakane/Math154/Syllabus.pdf

Technology Survey on Canvas

Practice Quiz

What is your favorite number?

(A) 0

(B) e

(C) π

(D) 17

(E) 154

Office Hours

Daniel Kane: Thursdays 12-1, Fridays 12-2 or by appointment
https://ucsd.zoom.us/my/dankane

Ji Zeng: Mondays and Wednesdays 1:00-2:30pm
https://ucsd.zoom.us/my/jzeng

Jiaxi Nie: Tuesdays and Thursdays 4:00-5:30pm
https://ucsd.zoom.us/j/6511860878

Basic Graph Concepts (Ch 1.1)

- What is a graph?
- Drawing graphs
- Basic terminology
- Basic types of graphs
- Walks, Paths, and Connectivity

Why graphs?

Graphs are an abstraction to describe how various things connect to each other. Road networks, electrical grids, social networks and the internet can all be modeled in various ways by graphs.

Graph Definition

Definition: A *graph* G = (V,E) consists of two things:

- A collection V of *vertices*, or objects to be connected.
- A collection E of *edges*, each of which connects a pair of vertices.

Question: Which are graphs?

Which of the following could be modeled by a graph?

A) The internet, V = {websites}, E = {links}

B) The internet, V = {computers},
E = {physical connections}

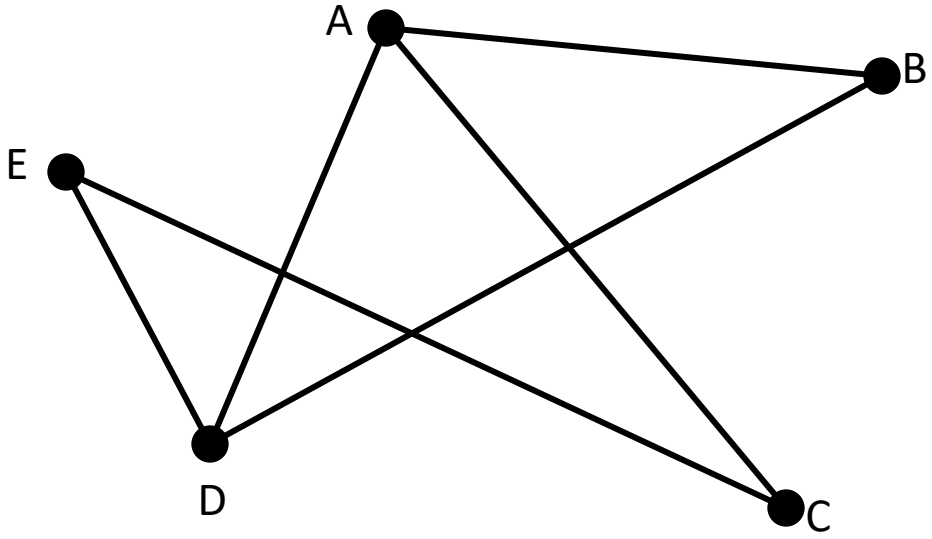
C) UCSD, V = {students}, E = {classes}

D) Highway System, V = {intersections},
E = {roads}

E) A book, V = {words}

Drawing Graphs

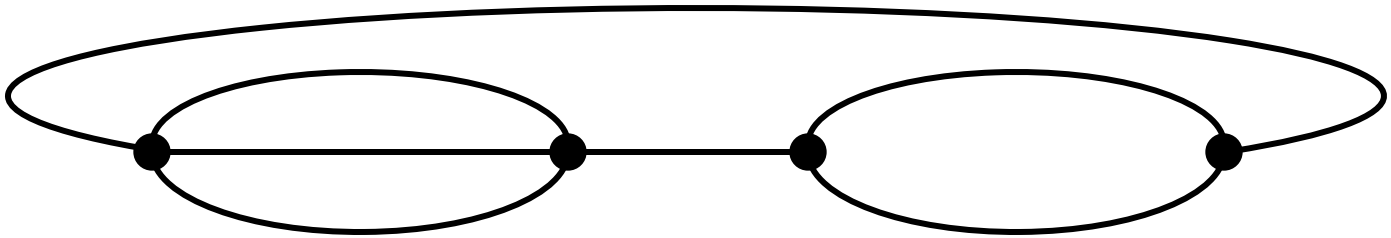
- Draw vertices as points
- Draw edges as line segments or curves connecting those points



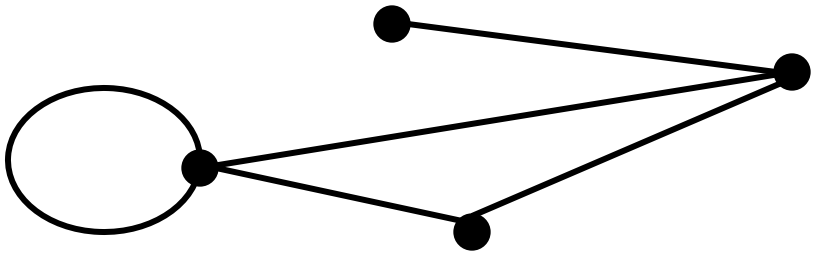
V = {A,B,C,D,E}
E = {AB,AC,AD,
BD,CE,DE}

Other Types of Graphs I

A *mutligraph* can have multiple edges between the same pair of vertices.



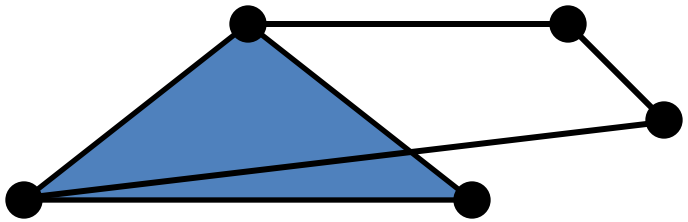
A *pseduograph* can have loops, edges connecting a vertex to itself.



A graph is called *simple* if it has neither.

Other Types of Graphs II

A *hypergraph* can have edges that connect more than two vertices.



A *directed graph* has edges that only point in one direction