CSI 35, Homework 7 on sections 10.1, 10.2

Due by Wed, Mar 26.

Section 10.1 Graphs and models

(1) Draw examples of the following graphs, each with at least 4 vertices and 4 edges:

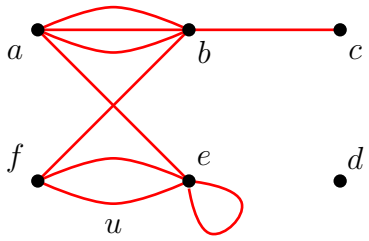
- **(a)** An undirected simple graph.
- **(b)** An undirected multigraph that is not simple.
- **(c)** An undirected pseudograph that is not a multigraph.
- **(d)** A directed graph (of any kind).

(2) What kind of graph would be best to model the NYC subway system? Explain if multiple edges, loops or directed edges would be needed.

Section 10.2 Graph terminology

(3) For this pseudograph

$G = (V, E)$



answer the following:

- **(a)** Find $|V|$ and $|E|$.
- **(b)** Find all vertices adjacent to vertex b.
- **(c)** Find $\deg(a)$ and $\deg(e)$.
- **(d)** What are the endpoints of edge u?
- **(e)** Identify any isolated or pendant vertices.

(4) What does the Handshaking Theorem say exactly? Verify it for the graph in the previous question.

(5) Let G be a simple graph with 7 vertices.

- **(a)** What are the possible degrees of the vertices of G?
- **(b)** Could all the vertices of G have different degrees? Why not?
  (Hint: think about vertices of degree 0 and degree 6.)
- **(c)** Draw an example of a multigraph (any size) that has vertices with all degrees different.

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes or section in the textbook.
- Ask me about it after class.
- Come to my office hours: Mon 2:00 - 3:00, Wed 2:00 - 3:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.