CS 305 Prelab 10: graphs
Fall 2019

Name: _____(done individually) score: _____ / 30

This prelab is due on Friday NLT start of class.

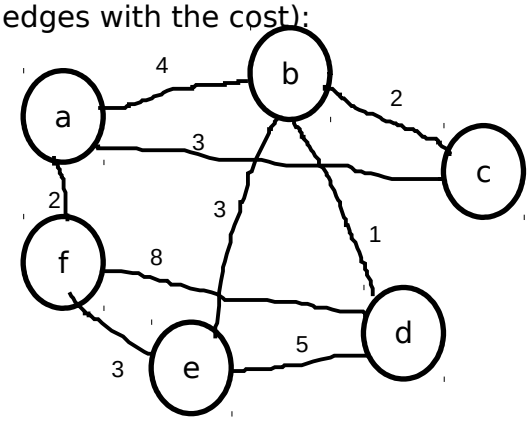
Readings (do before the lab)

1. Read about graphs in the textbook, chapter 7.
2. Review your lecture notes about graphs.

Exercises (do before the lab)

1. (5 points) Suppose an undirected graph is stored as an adjacency matrix. Graph nodes are represented by single letters, as shown below. Finish drawing the graph (with circles for vertices and lines for edges; label edges with the cost):

	a	b	c	d	e	f
a	0	4	3	0	0	2
b	4	0	2	1	3	0
c	3	2	0	0	0	0
d	0	1	0	0	5	8
e	0	3	0	5	0	3
f	2	0	0	8	3	0



2. (5 points) Now, convert the same graph in problem 1 to the adjacency list representation. Node a has been done for you. Note that the list should contain pairs (node, distance).

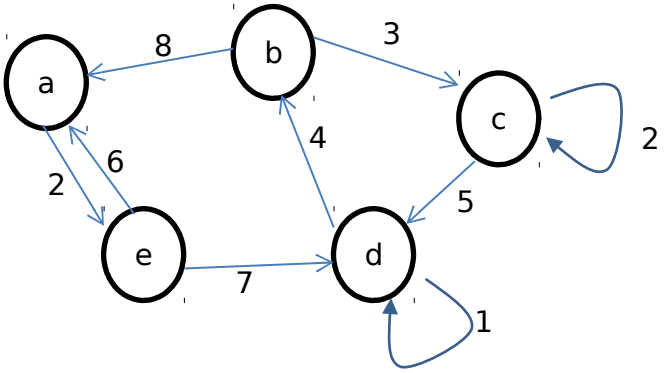
a: {(b, 4), (c, 3), (f, 2)}
b: {(a,4), (e,3), (d,1), (c,2)}
c: {(a,3), (b,2)}
d: {(e,5), (b,1), (f,8)}
e: {(d,5), (f,3)}
f: {(a,2), (d,8), (e,3)}

3. (1 point) In the graph above, what is the degree of node d? 2

4. (1 point) Which node has the highest degree in the graph above? b

5. (4 points) What is the lowest cost path to get from node d to node f in the graph above (show the nodes in the path and the total cost)? d->b->a->f 7

6. (6 points) Now consider the following directed graph. Complete the adjacency matrix representation for this graph. The first row has been done for you.



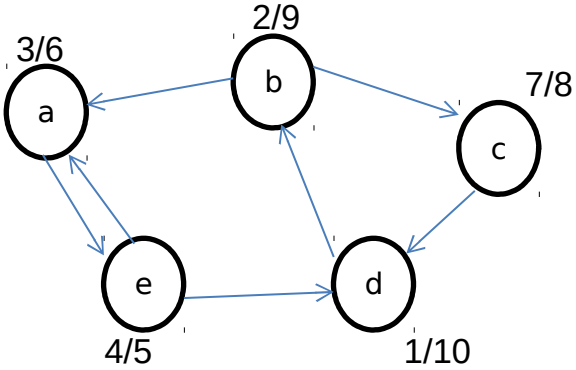
	a	b	c	d	e
a	0	0	0	0	2
b	8	0	3	0	0
c	0	0	2	5	0
d	0	4	0	1	0
e	6	0	0	7	0

7. (1 point) Does the graph in problem 6 contain a cycle? (YES) NO

8. (1 point) What is the out degree of node d in problem 6? 2

9. (1 point) What is the in degree of node d in problem 6? 3

10. (5 points) Show the parent, discover/finish times for DFS from node d in the graph below. Put this information on the graph below next to the nodes. p: disc/finish



Bring to lab

- Your CS 305 notes.
- Your Data Structures in C textbook.
- A pencil/pen and scratch paper.
- Your completed prelab, done on this sheet.