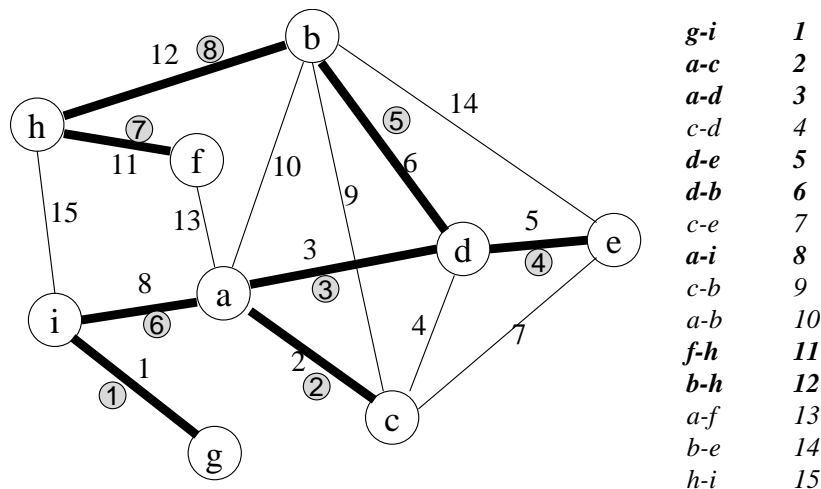


CS 3343 (Spring 2008) Assignment 9

Solution

1. (15 points) Kruskal's algorithm for finding minimum spanning tree.

Run Kruskal's algorithm on the graph below. Label each edge by the order in which it was selected.



2. (15 points) Prim's algorithm for finding minimum spanning tree.

Run Prim's algorithm on the same graph above. For simplicity we use a distance array rather than a priority queue. Show the edges selected at each step and the contents of the array after each update. You can use the graphs on page 2 for your convenience. You may start at vertex *e*.

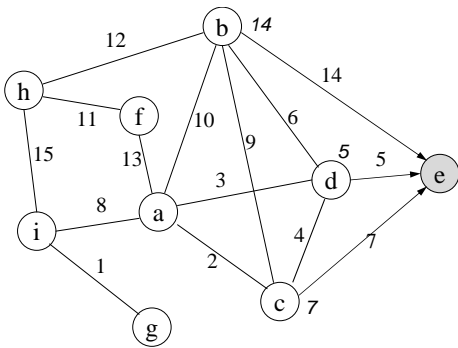
See solutions on the next page.

3. (15 points) Dijkstra's algorithm for finding single-source shortest paths.

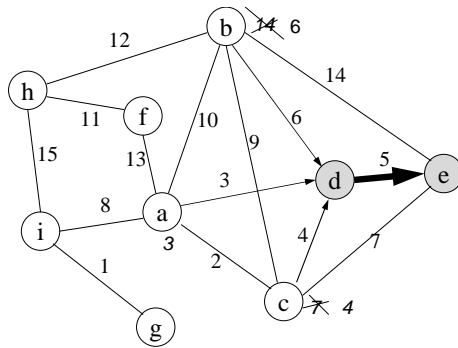
Run Dijkstra's algorithm on the same graph above to find the shortest paths from *e* to all other vertices. For simplicity we use a distance array rather than a priority queue. Show the edges selected at each step and the contents of the array after each update. You can use the graphs on page 3 for your convenience.

See solutions on page 3.

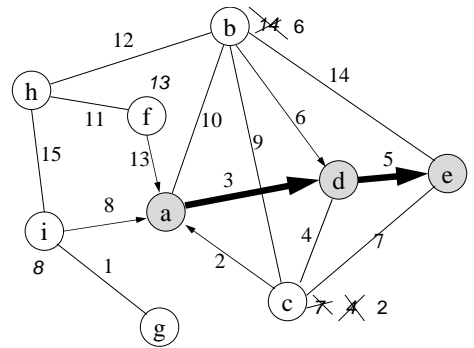
Prim's algorithm for finding minimum spanning tree.



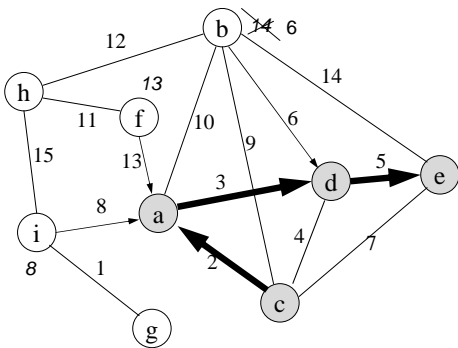
a	b	c	d	e	f	g	h	i
∞	14	7	5	0	∞	∞	∞	∞



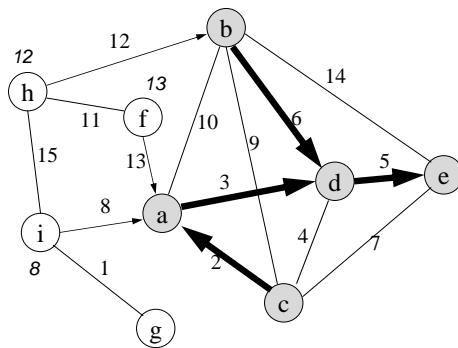
a	b	c	d	e	f	g	h	i
3	6	4	0	0	∞	∞	∞	∞



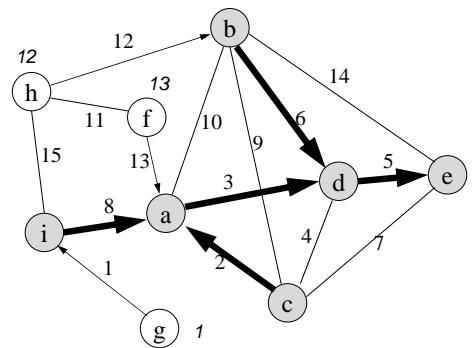
a	b	c	d	e	f	g	h	i
0	6	2	0	0	13	∞	∞	8



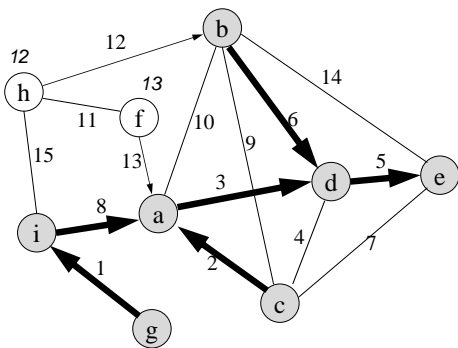
a	b	c	d	e	f	g	h	i
0	6	0	0	0	13	∞	∞	8



a	b	c	d	e	f	g	h	i
0	0	0	0	0	13	∞	12	8



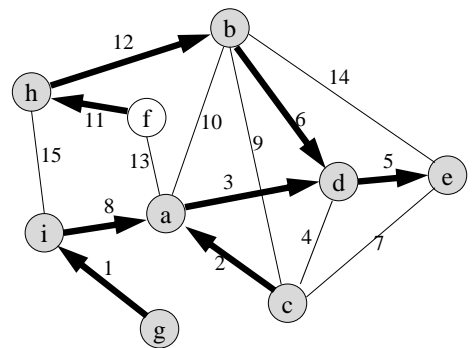
a	b	c	d	e	f	g	h	i
0	0	0	0	0	13	1	12	0



a	b	c	d	e	f	g	h	i
0	0	0	0	0	13	0	12	0

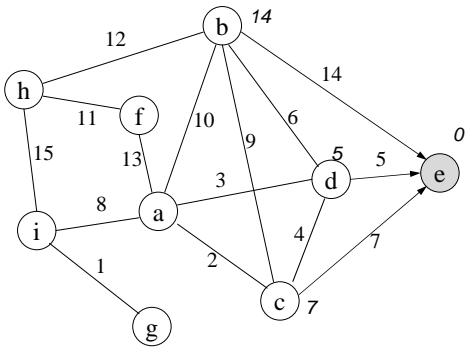


a	b	c	d	e	f	g	h	i
0	0	0	0	0	11	0	0	0

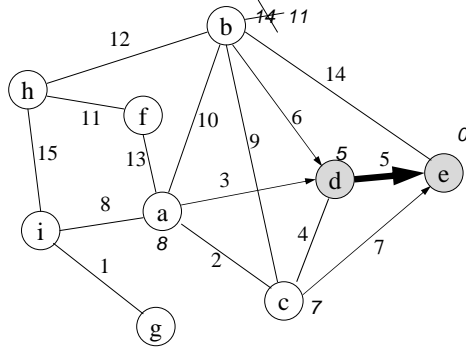


a	b	c	d	e	f	g	h	i
0	0	0	0	0	0	0	0	0

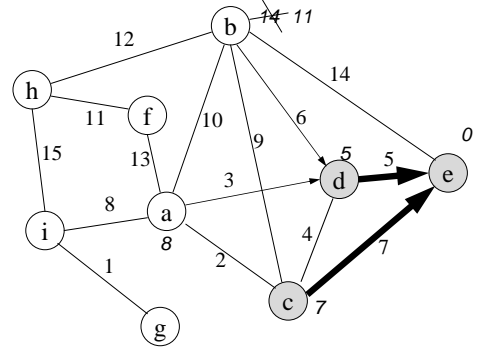
Dijkstra's algorithm for finding single-source shortest paths.



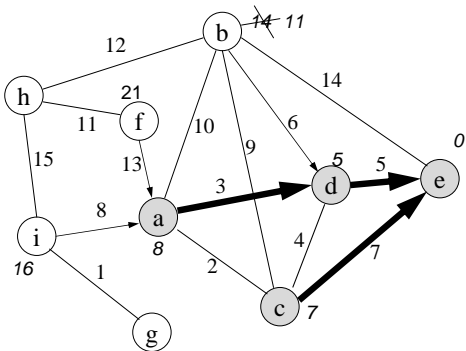
a	b	c	d	e	f	g	h	i
∞	14	7	5	0	∞	∞	∞	∞



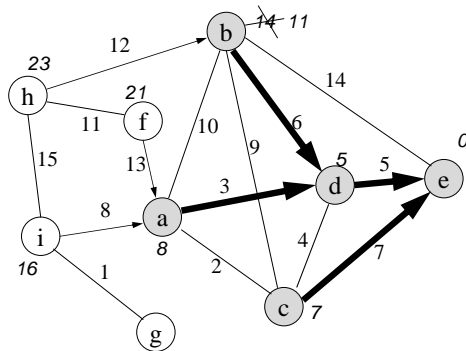
a	b	c	d	e	f	g	h	i
8	11	7	5	0	∞	∞	∞	∞



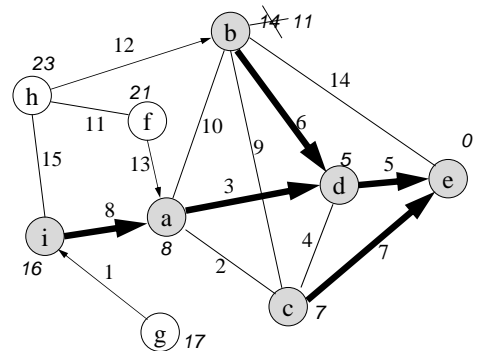
a	b	c	d	e	f	g	h	i
8	11	7	5	0	∞	∞	∞	∞



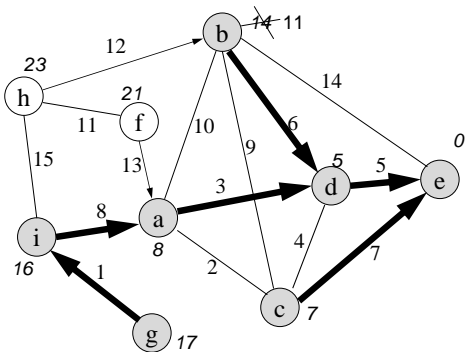
a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	∞	∞	16



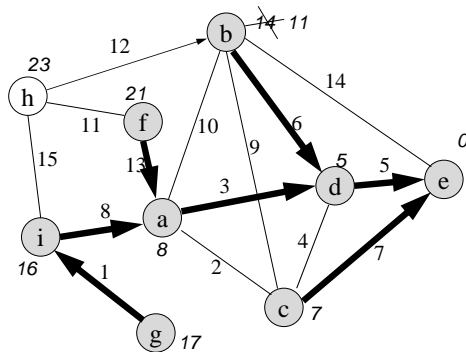
a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	∞	23	16



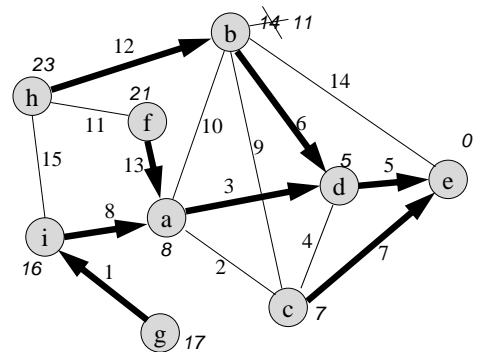
a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	17	23	16



a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	17	23	16



a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	17	23	16



a	b	c	d	e	f	g	h	i
8	11	7	5	0	21	17	23	16