Jason Dorweiler - Assignment 6.4
Assignment: Section 9.6: 8 (a,b,c,d), 14, 18 (explain your answer)

8. Find a shortest path(in mileage) between each of the following pairs of cities in the airline system shown in Figure 1.
a. New York and Los Angeles
The table below shows the progression following Dijkstra's algorithm starting from NY and ending at LA. The shortest path is NY to LA 2451 miles.

Start: NY	Boston	Chicago	Atlanta	Miami	Denver	San Fran	LA	New Node
L1	191	722	760	1090	∞	2534	2451	
L2	191	722	760	1090	∞	2534	2451	Boston
L3	191	722	760	1090	1630	2534	2451	Chicago
L4	191	722	760	1090	1630	2534	2451	Atlanta
L5	191	722	760	1090	1630	2534	2451	Denver
L6							2451	LA

b) Boston and San Francisco
From the table below the shortest path is from Boston-Chicago-SanFran

Start Boston	NY	Chicago	Atlanta	Miami	Denver	San Fran	LA	New Node
L1	191	860	∞	∞	∞	∞	∞	
L2	191	860	951	1281	∞	2725	2642	NY
L3	191	860	951	1281	1768	2715 (Chi)	2642	Chicago
L4	191	860	951	1281	1768	2715 (Chi)	2642	Atlanta
L5	191	860	951	1281	1768	2715 (Chi)	2642	Miami
L6	191	860	951	1281	1768	2715 (Chi)	2642	Denver
L7	191	860	951	1281	1768	2715 (Chi)	2642	LA

c) Miami and Denver
From the table below the shortest path is from Miami-Atlanta-Chicago-Denver

Start Miami	NY	Chicago	Atlanta	Boston	Denver	San Fran	LA	New Node
L1	1090	∞	595	∞	∞	∞	∞	
L2	1090	1201	595	∞	∞	∞	∞	Atlanta
L3	1090	1201	595	1281	∞	3624	3541	NY
L4	1090	1201	595	1281	2019	3624	3541	Chicago
L5	1090	1201	595	1281	2109	3056 (boston)	3541	Boston

d) Miami and Los Angeles
From the table below the shortest path is from Miami-Atlanta-Chicago-Denver-LA

Start Miami	NY	Chicago	Atlanta	Boston	Denver	San Fran	LA	New Node
L1	1090	∞	595	∞	∞	∞	∞	
L2	1090	1201	595	∞	∞	∞	∞	Atlanta
L3	1090	1201	595	1281	∞	3624	3541	NY
L4	1090	1201	595	1281	2019	3624	3541	Chicago
L5	1090	1201	595	1281	2109	3056 (boston)	3541	Boston
L6	1090	1201	595	1281	2109	3056 (boston)	2943 (denver)	Denver

14. Explain how to find a path with the least number of edges between two vertices in an undirected graph by considering it as a shortest path problem in a weighted graph.

By ignoring the edge weights (or setting them to 1) you can use Dijkstra's algorithm to find the shortest path with will then be the one with the least number of edges.

18. Is a shortest path between vertices in a weighted graph unique if the weights of edges are distinct?

This is not true. The weights of all of the edges can be distinct but there could still be more than one path through the graph that has the same minimum sum of edge weights.