Solutions to Homework Practice Problems

Practice problems:

1. [DPV] Problems 5.1, 5.2 (Practice fundamentals of MST designs)

5.1
(a) the cost is 19
(b) there are 2 possible MSTs
(c)

Edge included	Cut
AE	{A,B,C,D} & {E, F,G,H}
EF	{A,B,C,D,E} & {F, G,H}
BE	{A,E, F, G,H} & {B,C,D}
FG	{A,B,E,F} & {C,D,G,H}
GH	{A,B,E, F,G} & {C,D,H}
CG	{A,B,E, F, G,H} & {C,D}
GD	{A,B,C,E, F, G,H} & {D}

5.2
(a)

Vertex included	Edge included	Cost
A		0
B	AB	1
C	BC	3
G	CG	5
D	GD	6
F	GF	7
H	GH	8
E	AE	12

(B) Here are the values for the parent pointer π at each iteration of Kruskals. From this you should be able to deduce the disjoint-sets.

Union	Values of π for each vertex
Start	[A, B, C, D, E, F, G, H]
(A,B)	[B, B, C, D, E, F, G, H]
(F,G)	[B, B, C, D, E, G, G, H]
(D,G)	[B, B, C, G, E, G, G, H]
(G,H)	[B, B, C, G, E, G, G, G]
(C,G)	[B, B, G, G, E, G, G, G]
(B,C)	[B, G, G, G, E, G, G, G]
(A,E)	[G, G, G, G, G, G, G, G]

[DPV] Problem 5.9

(a) **False**. Consider a graph where a vertex is adjacent to a single edge
(b) **True**. Consider the order in which edges would be processed by Kruskal's
(c) **True**. A minimum weight edge would be a candidate for at least one possible MST
(d) **True**. The *Cut Property* assures this