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Worksheet 2-10 - Graph Theory

1. (a) Apply Kruskal's algorithm for the graph below to obtain a minim

(b) For the same graph, apply now Prim's algorithm starting with the vert
tree.

Note: The trees you get in parts (a) and (b) may not be the same, but their weights should be the same.

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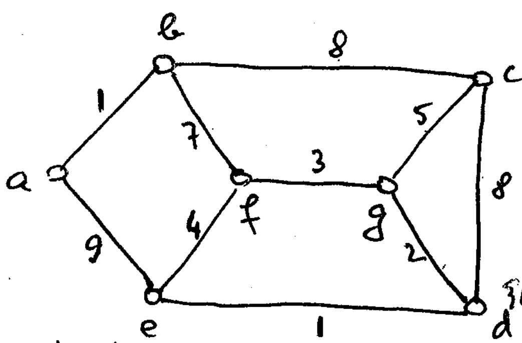
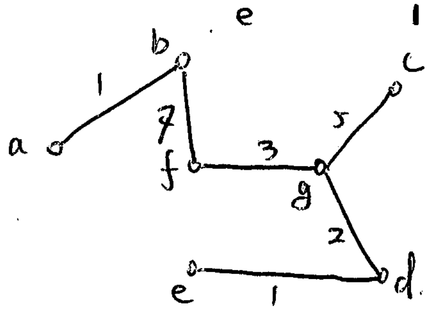


(a) order edges: $e_1 = ab$, $e_2 = de$, $e_3 = dg$, $e_4 = gf$, $e_5 = fe$, $e_6 = gc$, $e_7 = bf$, $e_8 = cd$, $e_9 = cb$, $e_{10} = a$

E(T)	Partition P	i	Endpts of e
$\emptyset$	{{a},{b},{c},{d},{e},{f},{g}}	1	{a,b}
{ab}	{{a,b},{c},{d},{e},{f},{g}}	2	{d,e}
{ab, de}	{{a,b},{c},{d,e},{f},{g}}	3	{d,g}
{ab, de, dg}	{{a,b},{c},{d,e,g},{f}}	4	{g,f}
{ab, de, dg, gf}	{{a,b},{c},{d,e,f,g}}	5	{f,e}
no change	no change	6	{g,c}
{ab, de, dg, gf, gc}	{{a,b},{c,d,e,f,g}}	7	{b,f}
{ab, de, dg, gf, gc, bf}	{a,b,c,d,e,f,g} = V(G) ⇒ STOP		

So, the final E(T) is {ab, de, dg, gf, gc, bf}.



$w(T) = 1+7+3+5+2+1$
$= 19$

(b)

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E(T)	V(T)	a	b	c	d	e	f	g	x_0
		d(x_0, V(T))							
$\emptyset$	{c}	∞	8	0	8	∞	∞	5	g
{cg}	{c,g}	∞	8	-	2	∞	3	-	d
{cg, gd}	{c,d,g}	∞	8	-	-	1	3	-	e
{cg, gd, de}	{c,d,e,g}	9	8	-	-	-	3	-	f
{cg, gd, de, gf}	{c,d,e,f,g}	9	7	-	-	-	-	-	b
{cg, gd, de, gf, fb}	{b,c,d,e,f,g}	1	-	-	-	-	-	-	a
{cg, gd, de, gf, fb, ba}	{a,b,c,d,e,f,g} ⇕ V(T) = V(G)	-	-	-	-	-	-	-	STOP

So, the final E(T) is {cg, gd, de, gf, fb, ba}