

CS456: Algorithm Design and Analysis

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Assignment 4

Problem 1 (Prim's Algorithm)

Tree Vertices	Remaining Vertices
a(-,-)	b(a,3) c(a,5) d(a,4) e(-,∞) f(-,∞) g(-,∞) h(-,∞) i(-,∞) j(-,∞) k(-,∞) l(-,∞)
b(a,3)	e(b, 3) f(b, 6) c(a, 5) d(a, 4) g(-,∞) h(-,∞) i(-,∞) j(-,∞) k(-,∞) l(-,∞)
e(b,3)	f(e, 2) d(e, 1) i(e, 4) c(a,5) g(-,∞) h(-,∞) j(-,∞) k(-,∞) l(-,∞)
d(e,1)	f(e,2) i(e,4) c(d,2) g(-,∞) h(d, 5) j(-,∞) k(-,∞) l(-,∞)
c(d,2)	f(e,2) i(e,4) g(c, 4) h(d,5) j(-,∞) k(-,∞) l(-,∞)
f(e,2)	i(e,4) g(c,4) h(d,5) j(f, 5) k(-,∞) l(-,∞)
i(e,4)	g(c,4) h(d,5) j(i,3) l(i, 5) k(-,∞)
j(i,3)	g(c,4) h(d,5) l(i,5) k(-,∞)
g(c,4)	h(g,3) l(i,5) k(g, 6)
h(g,3)	l(i,5) k(g,6)
l(i,5)	k(g,6)
k(g,6)	

Table 1: Prim's Algorithm to produce minimum spanning tree

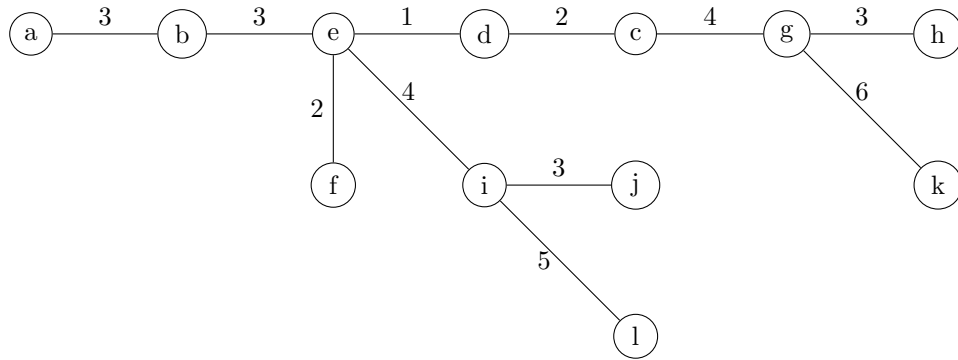


Figure 1: Minimum Spanning Tree generated using Prim's Algorithm

Problem 2 (Kruskal's Algorithm)

Tree Edges	Sorted List of Edges
	de(1) cd(2) ef(2) ab(3) be(3) gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
de(1)	cd(2) ef(2) ab(3) be(3) gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
cd(2)	ef(2) ab(3) be(3) gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
ef(2)	ab(3) be(3) gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
ab(3)	be(3) gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
be(3)	gh(3) ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
gh(3)	ij(3) ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
ij(3)	ad(4) cg(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
cg(4)	ad(4) ei(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
ei(4)	ad(4) ac(5) dh(5) fj(5) il(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
il(5)	dh(5) fj(5) ac(5) bf(6) gk(6) hi(6) hk(7) kl(8) jl(9)
gk(6)	hi(6) hk(7) ac(5) bf(6) kl(8) jl(9)

Table 2: Kruskal's Algorithm to produce minimum spanning tree

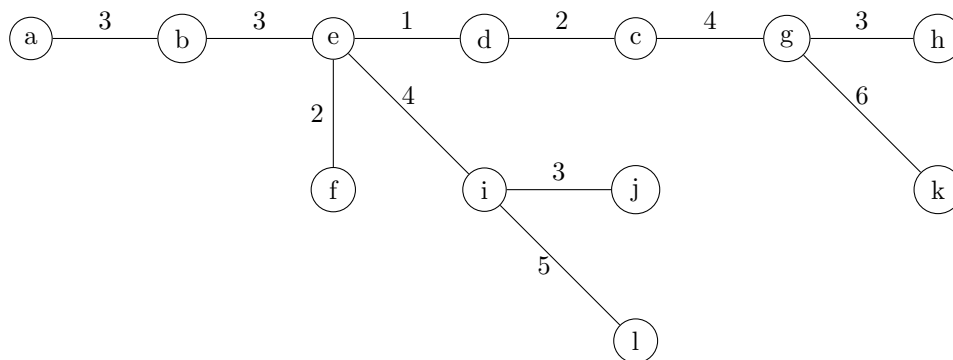


Figure 2: Minimum Spanning Tree generated using Kruskal's Algorithm