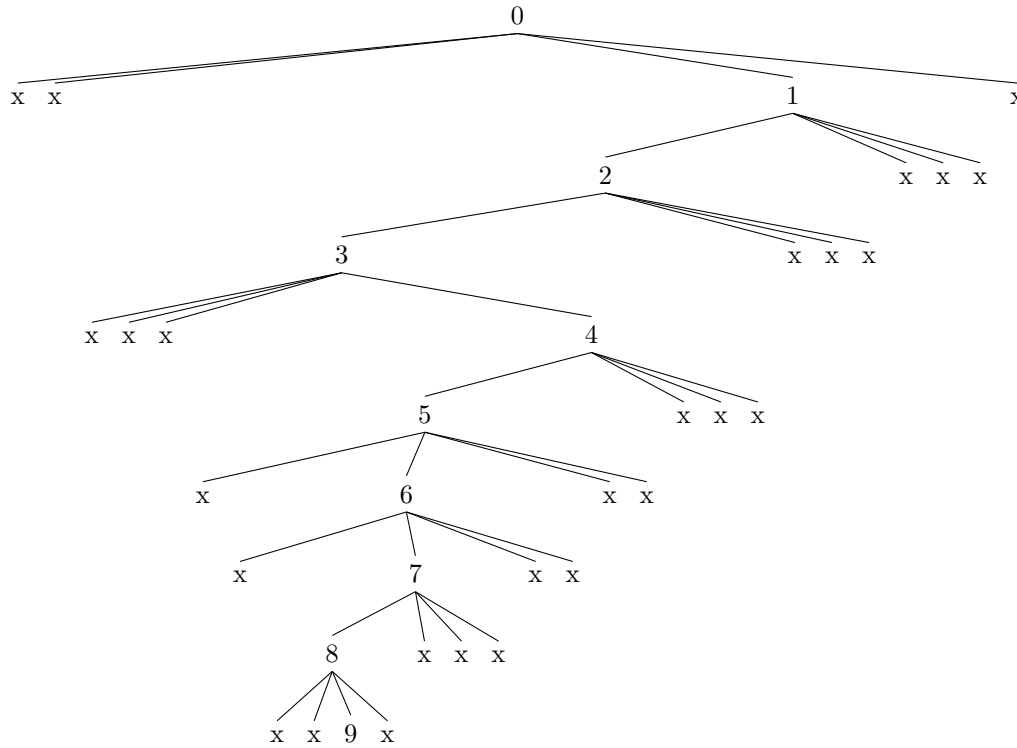
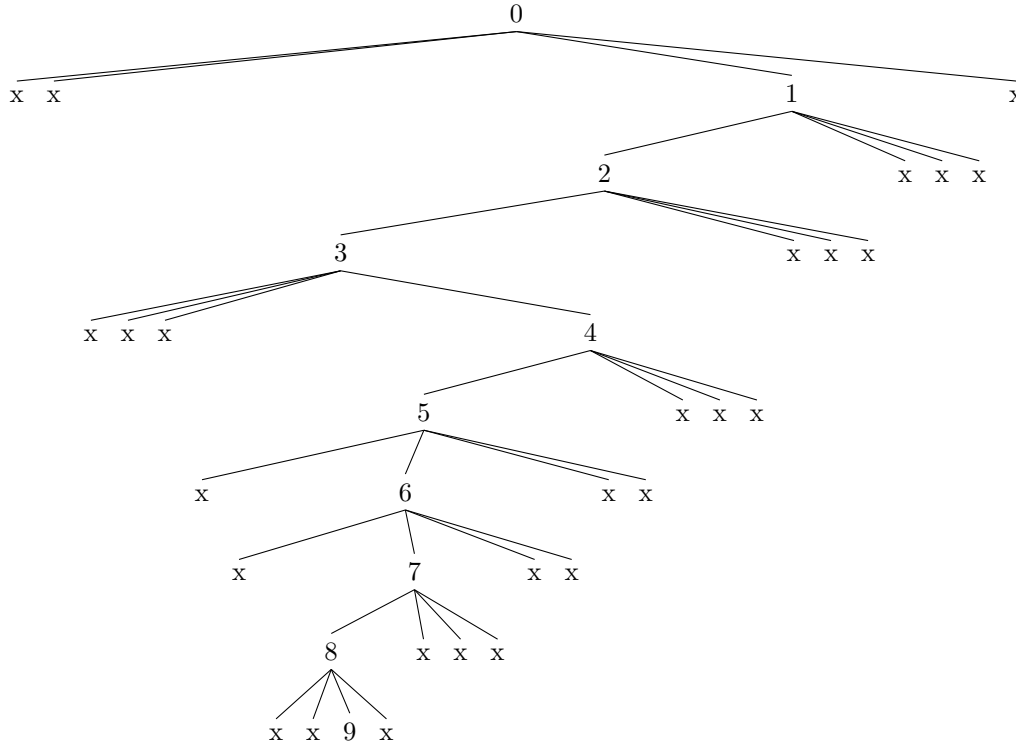


1 quaternary angle tree (leafmin) (N=10 R=4 theta=0.124355)



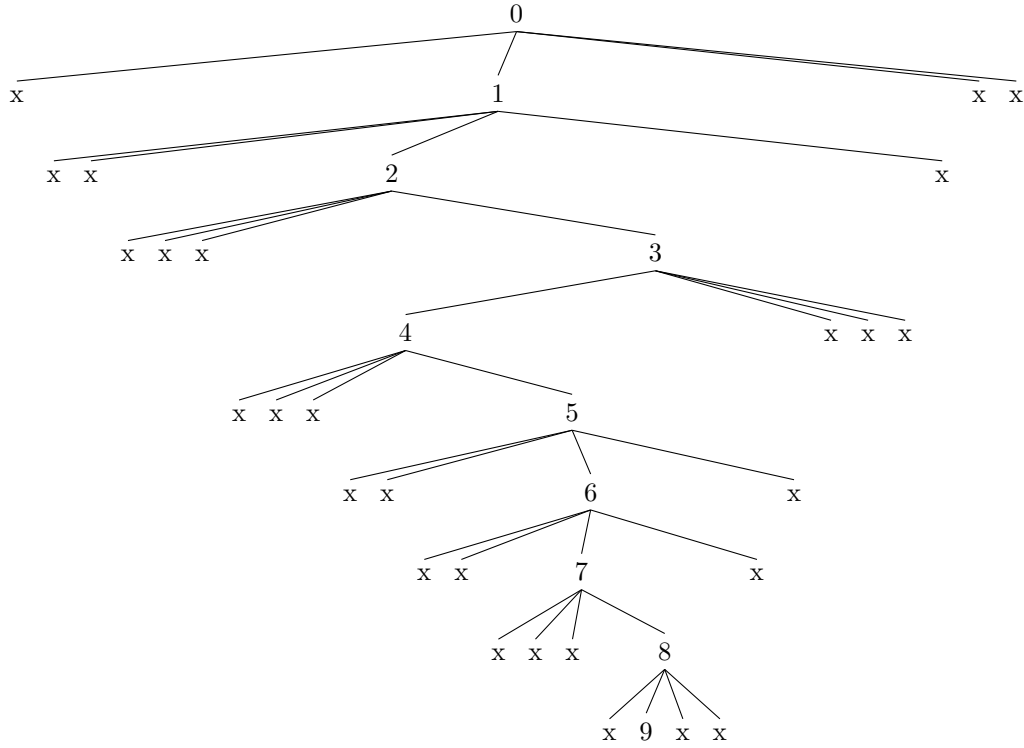
$i$	$br$	$theta$	$-u_0$	$a(2 * i)$	$-u_1$	$a(2 * i + 1)$	$theta'$
0	2	0.124355	1	0.785398	-1	0.463648	0.446106
1	0	0.446106	-1	0.244979	-1	0.124355	0.076772
2	0	0.076772	-1	0.062419	-1	0.031240	-0.016887
3	3	-0.016887	1	0.015624	1	0.007812	0.006549
4	0	0.006549	-1	0.003906	-1	0.001953	0.000690
5	1	0.000690	-1	0.000977	1	0.000488	0.000202
6	1	0.000202	-1	0.000244	1	0.000122	0.000080
7	0	0.000080	-1	0.000061	-1	0.000031	-0.000012
8	2	-0.000012	1	0.000015	-1	0.000008	-0.000004

## 2 quaternary angle tree (globalmin) (N=10 R=4 theta=0.124355)



$i$	$br$	$theta$	$-u0$	$a(2 * i)$	$-u1$	$a(2 * i + 1)$	$theta'$
0	2	0.124355	1	0.785398	-1	0.463648	0.446106
1	0	0.446106	-1	0.244979	-1	0.124355	0.076772
2	0	0.076772	-1	0.062419	-1	0.031240	-0.016887
3	3	-0.016887	1	0.015624	1	0.007812	0.006549
4	0	0.006549	-1	0.003906	-1	0.001953	0.000690
5	1	0.000690	-1	0.000977	1	0.000488	0.000202
6	1	0.000202	-1	0.000244	1	0.000122	0.000080
7	0	0.000080	-1	0.000061	-1	0.000031	-0.000012
8	2	-0.000012	1	0.000015	-1	0.000008	-0.000004

### 3 quaternary angle tree (cordic) (N=10 R=4 theta=0.124355)



$i$	$br$	$theta$	$-u0$	$a(2 * i)$	$-u1$	$a(2 * i + 1)$	$theta'$
0	1	0.124355	-1	0.785398	1	0.463648	-0.197396
1	2	-0.197396	1	0.244979	-1	0.124355	-0.076772
2	3	-0.076772	1	0.062419	1	0.031240	0.016887
3	0	0.016887	-1	0.015624	-1	0.007812	-0.006549
4	3	-0.006549	1	0.003906	1	0.001953	-0.000690
5	2	-0.000690	1	0.000977	-1	0.000488	-0.000202
6	2	-0.000202	1	0.000244	-1	0.000122	-0.000080
7	3	-0.000080	1	0.000061	1	0.000031	0.000012
8	1	0.000012	-1	0.000015	1	0.000008	0.000004

quaternary angle tree search (N=10)
theta= atan(pow(2,-3) = 0.124355

\* the optimal path to a leaf

level min node : depth= 9 theta= -0.000004 minval= 0.000004 id=221607

path type : leafmin

Table with 5 columns: dp, th, br, and two unlabeled columns. Rows show values for dp from 0 to 9.

leafmin path=2 0 0 3 0 1 1 0 2

tree=[.0 x x [.1 [.2 [.3 x x x [.4 [.5 x [.6 x [.7 [.8 x x 9 x ] x x x ] x x ] x x ] x x ] ] x x x ] x x x ] x ]

latex quaternary\_tree\_1\_leafmin.tex > /dev/null
dvi2pdf quaternary\_tree\_1\_leafmin.dvi > /dev/null
xreader -w quaternary\_tree\_1\_leafmin.pdf > /dev/null

\* the global optimal path to a node

Table with 5 columns: level min node, depth, theta, minval, id. Rows show values for depth from 0 to 9.

global min node : depth= 9 theta= -0.000004 minval= 0.000004 id=221607

path type : globalmin

Table with 5 columns: dp, th, br, and two unlabeled columns. Rows show values for dp from 0 to 9.

globalmin path=2 0 0 3 0 1 1 0 2

tree=[.0 x x [.1 [.2 [.3 x x x [.4 [.5 x [.6 x [.7 [.8 x x 9 x ] x x x ] x x ] x x ] x x ] ] x x x ] x x x ] x ]

latex quaternary\_tree\_2\_globalmin.tex > /dev/null
dvi2pdf quaternary\_tree\_2\_globalmin.dvi > /dev/null
xreader -w quaternary\_tree\_2\_globalmin.pdf > /dev/null

\* the cordic path

cordic min node : depth= 9 theta= 0.124355 minval= 0.000004 id=0

path type : cordic

dp= 0 th=+0.124355	br= 1	:	-1.249046	-0.321751	0.321751	1.249046
dp= 1 th=-0.197396	br= 2	:	-0.369334	-0.120624	0.120624	0.369334
dp= 2 th=-0.0767719	br= 3	:	-0.093659	-0.031179	0.031179	0.093659
dp= 3 th=+0.0168868	br= 0	:	-0.023436	-0.007811	0.007811	0.023436
dp= 4 th=-0.00654932	br= 3	:	-0.005859	-0.001953	0.001953	0.005859
dp= 5 th=-0.000689965	br= 2	:	-0.001465	-0.000488	0.000488	0.001465
dp= 6 th=-0.000201684	br= 2	:	-0.000366	-0.000122	0.000122	0.000366
dp= 7 th=-7.96136e-05	br= 3	:	-0.000092	-0.000031	0.000031	0.000092
dp= 8 th=+1.19391e-05	br= 1	:	-0.000023	-0.000008	0.000008	0.000023
dp= 9 th=+4.30975e-06						

cordic path=1 2 3 0 3 2 2 3 1

tree=[.0 x [.1 x x [.2 x x x [.3 [.4 x x x [.5 x x [.6 x x [.7 x x x [.8 x 9 x x ] ] x ] x ] ] x x x ] ] x ] x x ]

```

latex quaternary_tree_3_cordic.tex > /dev/null
dvi2pdf quaternary_tree_3_cordic.dvi > /dev/null
xreader -w quaternary_tree_3_cordic.pdf > /dev/null

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