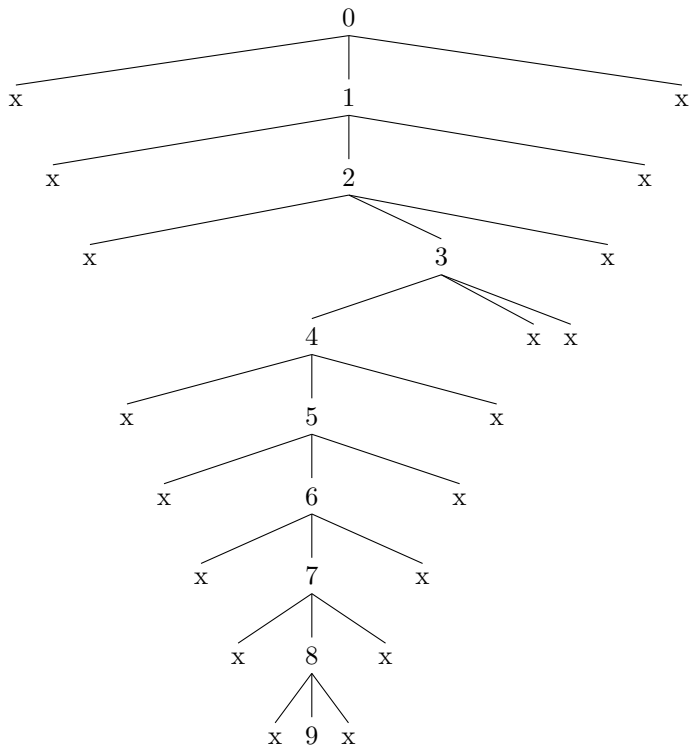
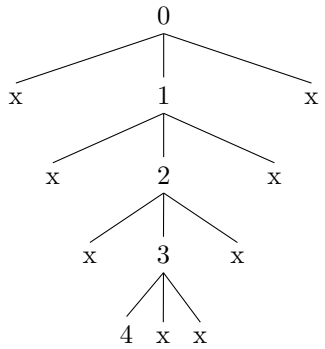
1 ternary angle tree (leafmin) (N=10 R=3 theta=0.124355)



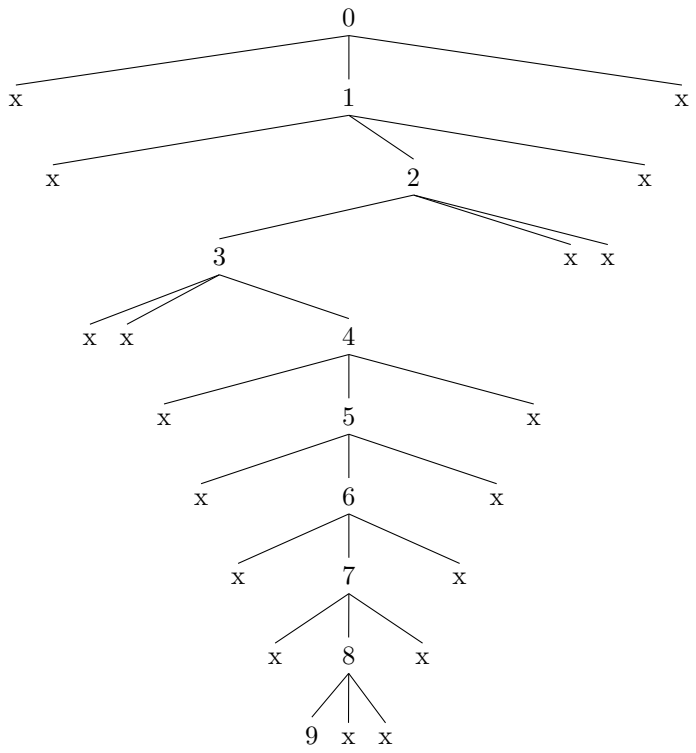
i	br	$theta$	$-u(i)$	$a(i)$	$theta'$
0	1	0.124355	0	0.785398	0.124355
1	1	0.124355	0	0.463648	0.124355
2	1	0.124355	0	0.244979	0.124355
3	0	0.124355	-1	0.124355	0.000000
4	1	0.000000	0	0.062419	0.000000
5	1	0.000000	0	0.031240	0.000000
6	1	0.000000	0	0.015624	0.000000
7	1	0.000000	0	0.007812	0.000000
8	1	0.000000	0	0.003906	0.000000

2 ternary angle tree (globalmin) (N=10 R=3 theta=0.124355)



i	br	$theta$	$-u(i)$	$a(i)$	$theta'$
0	1	0.124355	0	0.785398	0.124355
1	1	0.124355	0	0.463648	0.124355
2	1	0.124355	0	0.244979	0.124355
3	0	0.124355	-1	0.124355	0.000000

3 ternary angle tree (cordic) (N=10 R=3 theta=0.124355)



i	br	$theta$	$-u(i)$	$a(i)$	$theta'$
0	1	0.124355	0	0.785398	0.124355
1	1	0.124355	0	0.463648	0.124355
2	0	0.124355	-1	0.244979	-0.120624
3	2	-0.120624	1	0.124355	0.003731
4	1	0.003731	0	0.062419	0.003731
5	1	0.003731	0	0.031240	0.003731
6	1	0.003731	0	0.015624	0.003731
7	1	0.003731	0	0.007812	0.003731
8	0	0.003731	-1	0.003906	-0.000175

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

====================================
* the leaf optimal path
====================================
* leaf min node : depth=  9 theta= +0.000000e+00 id=19439

path type : leafmin
dp= 0 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.785398 +0.0  +0.785398
dp= 1 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.463648 +0.0  +0.463648
dp= 2 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.244979 +0.0  +0.244979
dp= 3 th=  0.124355 +1.2435499455e-01 br= 0  :  -0.124355 +0.0  +0.124355
dp= 4 th=  0.000000 +0.0000000000e+00 br= 1  :  -0.062419 +0.0  +0.062419
dp= 5 th=  0.000000 +0.0000000000e+00 br= 1  :  -0.031240 +0.0  +0.031240
dp= 6 th=  0.000000 +0.0000000000e+00 br= 1  :  -0.015624 +0.0  +0.015624
dp= 7 th=  0.000000 +0.0000000000e+00 br= 1  :  -0.007812 +0.0  +0.007812
dp= 8 th=  0.000000 +0.0000000000e+00 br= 1  :  -0.003906 +0.0  +0.003906
dp= 9 th=  0.000000 +0.0000000000e+00

leafmin path=1 1 1 0 1 1 1 1 1
tree=[.0 x [.1 x [.2 x [.3 [.4 x [.5 x [.6 x [.7 x [.8 x 9 x ]  x ]  x ]  x ]  x ]  x x ]
x ]  x ]  x ]
latex ternary_tree_1_leafmin.tex > /dev/null
dvipdf ternary_tree_1_leafmin.dvi > /dev/null
xreader -w ternary_tree_1_leafmin.pdf > /dev/null

====================================
* the global optimal path
====================================
level min node : depth=  0 theta= +1.243550e-01 id=0
level min node : depth=  1 theta= +1.243550e-01 id=2
level min node : depth=  2 theta= +1.243550e-01 id=8
level min node : depth=  3 theta= +4.758310e-02 id=21
level min node : depth=  4 theta= +0.000000e+00 id=79
level min node : depth=  5 theta= +0.000000e+00 id=239
level min node : depth=  6 theta= +0.000000e+00 id=719
level min node : depth=  7 theta= +0.000000e+00 id=2159
level min node : depth=  8 theta= +0.000000e+00 id=6479
level min node : depth=  9 theta= +0.000000e+00 id=19439

* global min node : depth=  4 theta= +0.000000e+00 id=79

path type : globalmin
dp= 0 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.785398 +0.0  +0.785398
dp= 1 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.463648 +0.0  +0.463648
dp= 2 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.244979 +0.0  +0.244979
dp= 3 th=  0.124355 +1.2435499455e-01 br= 0  :  -0.124355 +0.0  +0.124355
dp= 4 th=  0.000000 +0.0000000000e+00

globalmin path=1 1 1 0
tree=[.0 x [.1 x [.2 x [.3 4 x x ]  x ]  x ]  x ]
latex ternary_tree_2_globalmin.tex > /dev/null
dvipdf ternary_tree_2_globalmin.dvi > /dev/null
xreader -w ternary_tree_2_globalmin.pdf > /dev/null

====================================
* the cordic path
====================================
* cordic min node : depth=  9 theta= -1.749042e-04 id=19195

path type : cordic
dp= 0 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.785398 +0.0  +0.785398
dp= 1 th=  0.124355 +1.2435499455e-01 br= 1  :  -0.463648 +0.0  +0.463648
dp= 2 th=  0.124355 +1.2435499455e-01 br= 0  :  -0.244979 +0.0  +0.244979
dp= 3 th= -0.120624 -1.2062366858e-01 br= 2  :  -0.124355 +0.0  +0.124355
dp= 4 th=  0.003731 +3.7313259667e-03 br= 1  :  -0.062419 +0.0  +0.062419
dp= 5 th=  0.003731 +3.7313259667e-03 br= 1  :  -0.031240 +0.0  +0.031240
```

```
dp= 6 th=  0.003731 +3.7313259667e-03 br= 1  :  -0.015624 +0.0  +0.015624
dp= 7 th=  0.003731 +3.7313259667e-03 br= 1  :  -0.007812 +0.0  +0.007812
dp= 8 th=  0.003731 +3.7313259667e-03 br= 0  :  -0.003906 +0.0  +0.003906
dp= 9 th= -0.000175 -1.7490416531e-04

cordic path=1 1 0 2 1 1 1 1 0
tree=[.0 x [.1 x [.2 [.3 x x [.4 x [.5 x [.6 x [.7 x [.8 9 x x ]  x ]  x ]  x ]  x ]  ]  x
x ]  x ]  x ]
latex ternary_tree_3_cordic.tex > /dev/null
dvipdf ternary_tree_3_cordic.dvi > /dev/null
xreader -w ternary_tree_3_cordic.pdf > /dev/null
```