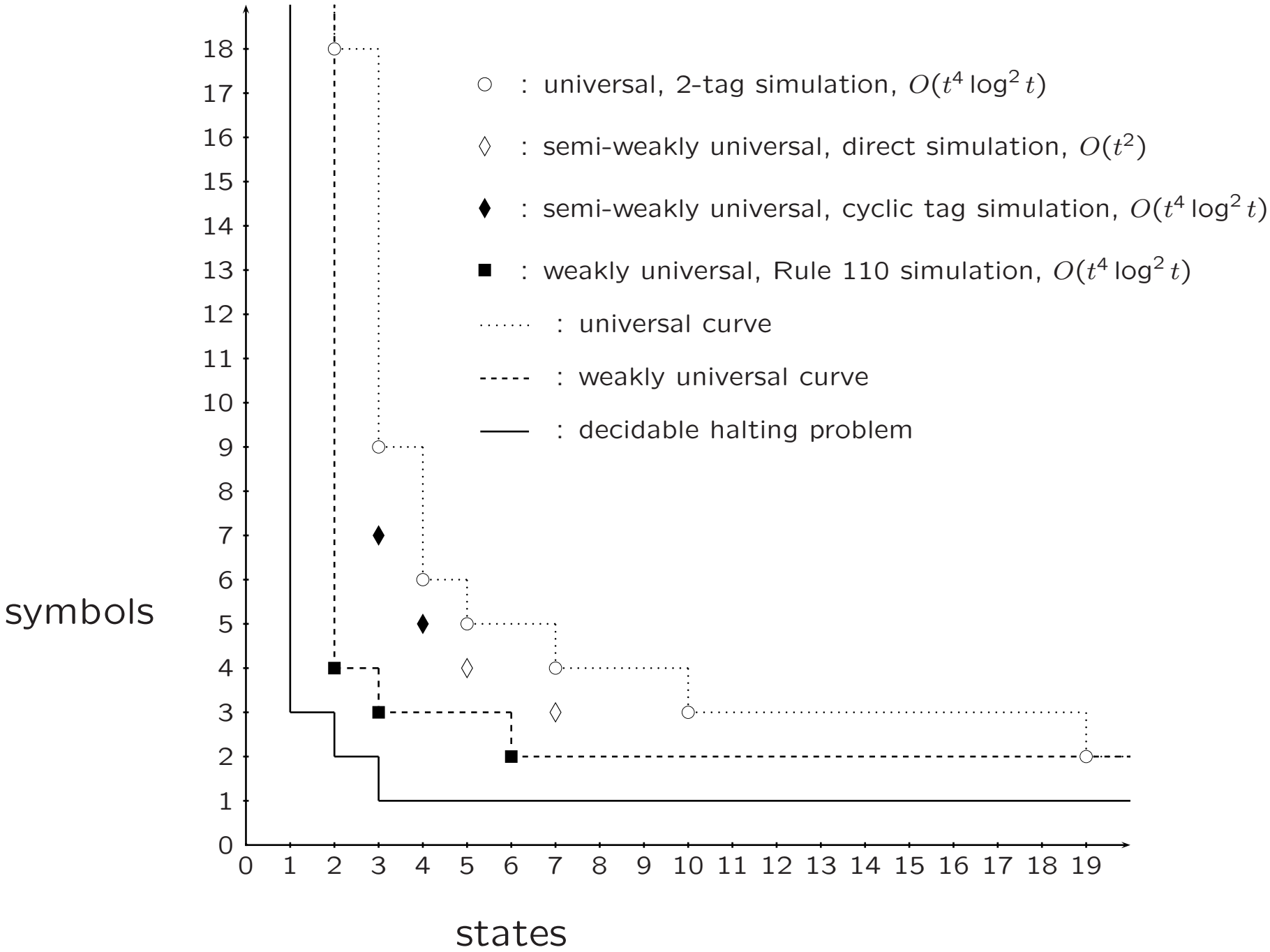
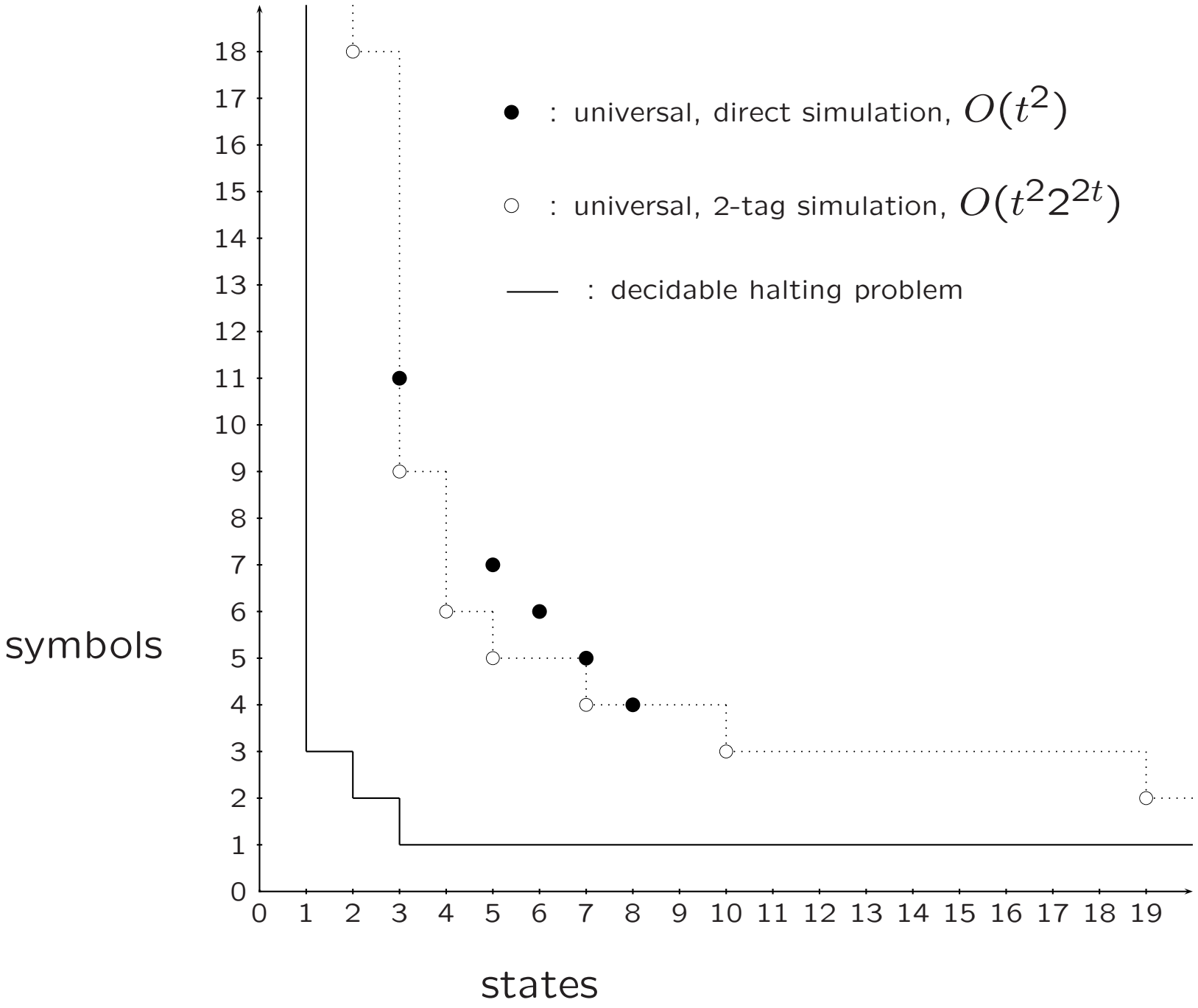
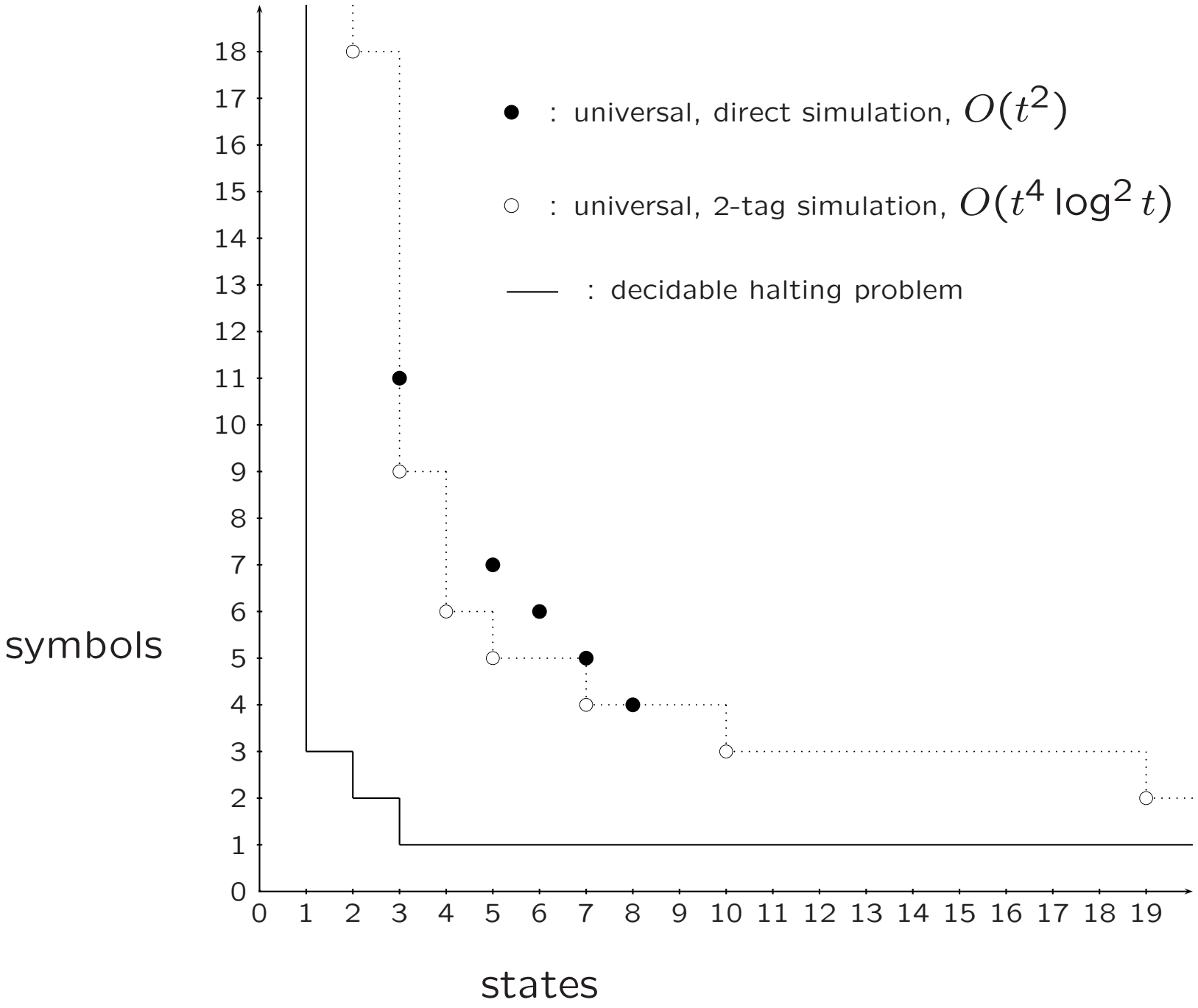
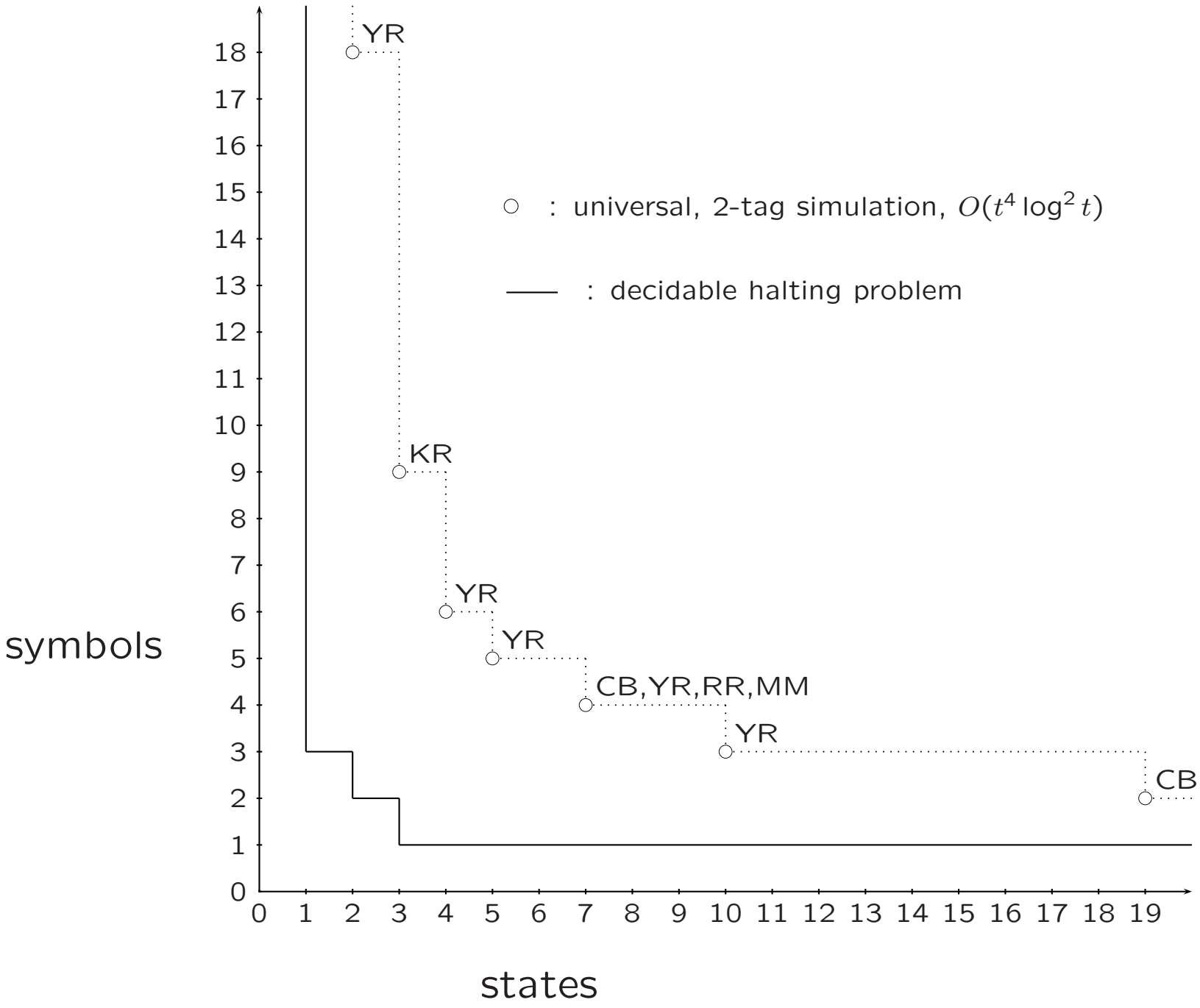
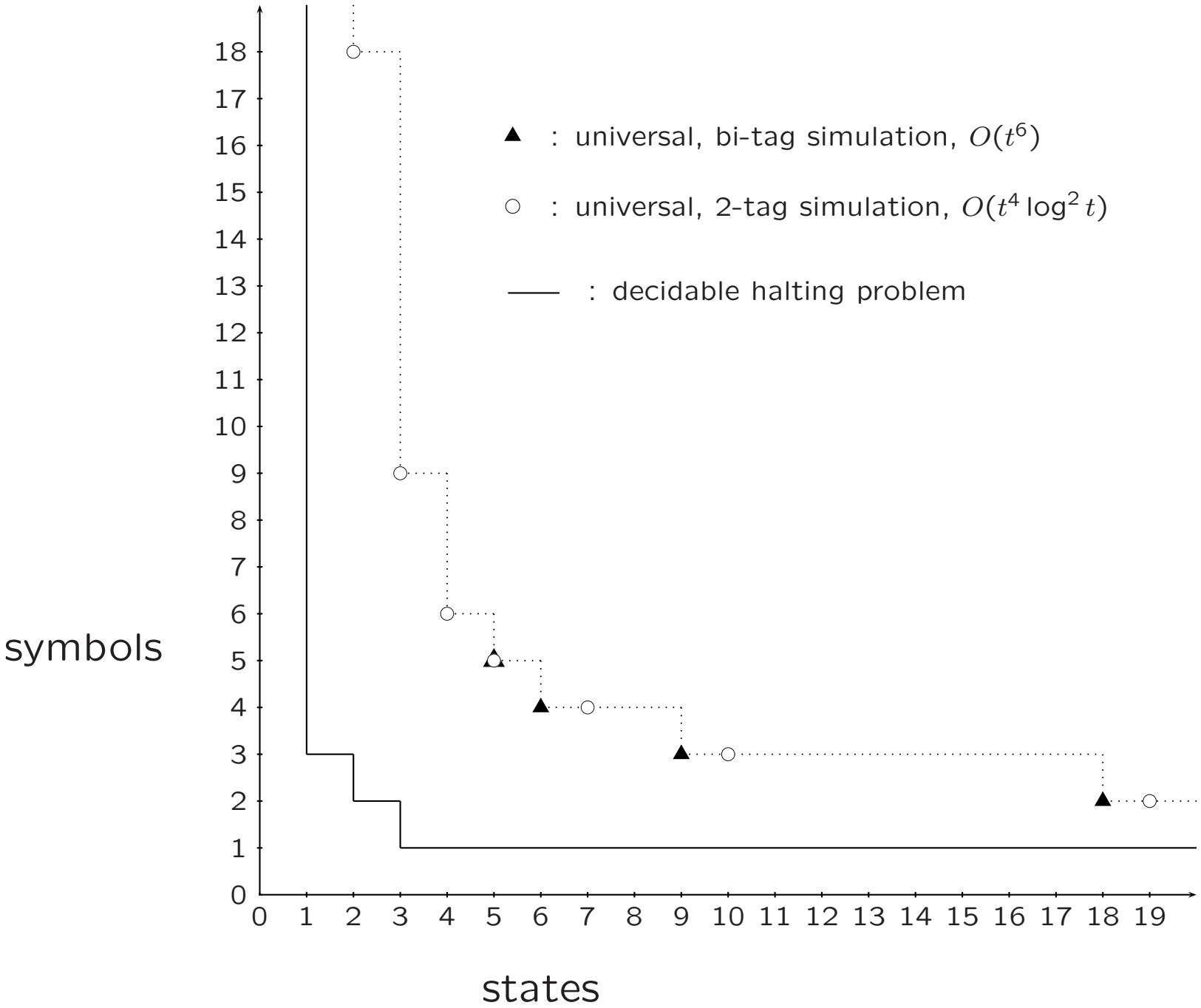

symbols
states
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
: universal, 2-tag simulation, $O(t^4 \log^2 t)$
: semi-weakly universal, direct simulation, $O(t^2)$
: semi-weakly universal, cyclic tag simulation, $O(t^4 \log^2 t)$
: weakly universal, Rule 110 simulation, $O(t^4 \log^2 t)$
: universal curve
: weakly universal curve
: decidable halting problem


: universal, direct simulation, $O(t^2)$
: universal, 2-tag simulation, $O(t^2 2^{2t})$
: decidable halting problem
symbols
states
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19


: universal, direct simulation, $O(t^2)$
: universal, 2-tag simulation, $O(t^4 \log^2 t)$
: decidable halting problem
symbols
states
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19


YR
KR
YR
YR
CB,YR,RR,MM
YR
CB
○ : universal, 2-tag simulation, $O(t^4 \log^2 t)$
—— : decidable halting problem
symbols
states
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19


symbols
states
0
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19
: universal, bi-tag simulation, $O(t^6)$
: universal, 2-tag simulation, $O(t^4 \log^2 t)$
: decidable halting problem