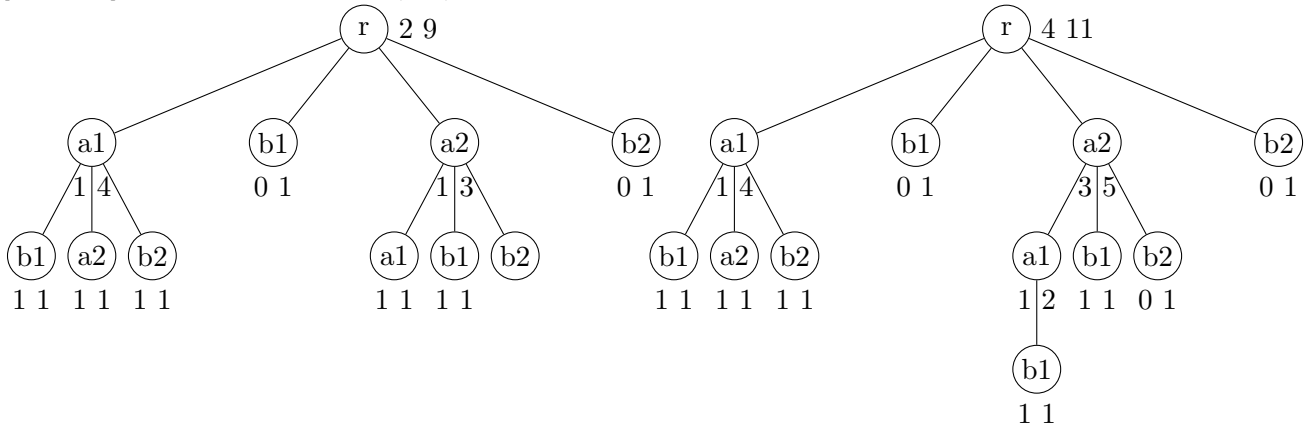


answers

1. [3 marks] Below is MCTS tree (left) after 9 sim'ns from *mcts x* in *mcts/main.py* and output from next sim'ns.



```
trv_xpnd bu * .5 .4 .6 .4 9 bu 9 1.4 1.4 10 no-sims child
  sim 10. * 9 10 roll 5 parent loss
trv_xpnd bu * .5 .5 .7 .5 9 bu 9 1.5 1.5 .5 5 xpnd_nd * 9 5 > 6
  sim 11. * 9 5 6 win, no more sibs
```

a) [2 marks] In `trv_xpnd bu * .5 .4 .6 .4 9`, what do `.5 .4 .6 .4` represent?

\$ Initial * indicates root node r. `.5 .4 .6 .4` are uct scores (wins/sims plus uct formula boost) for each child of root.

What does 9 represent?

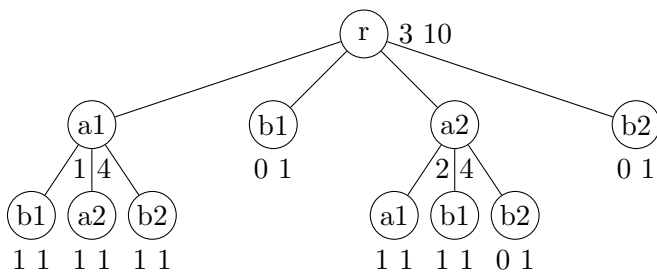
\$ 9 (a2) shows selected move. Move choices were 5 6 9 10 (a1 b1 a2 b2 respectively), so move associated with `.6` (node 9 a2) was picked.

b) [1 mark] In `bu 9 1.4 1.4 10 no-sims child`, what does `no-sims child` mean?

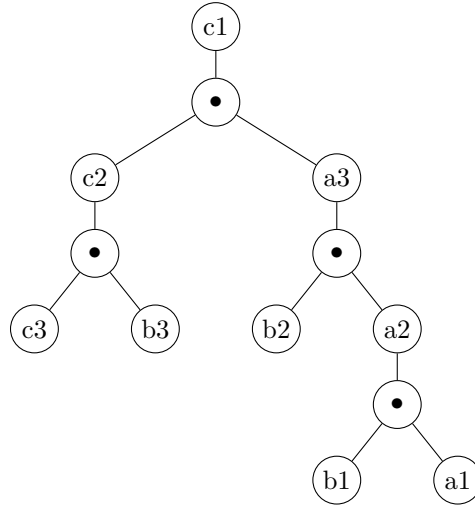
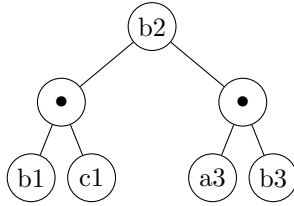
\$ In `best_uct`, in search for best child, child with no sims was found and sim performed there. That is why from node *9, which has 3 children, only 2 values are printed (1.4 1.4) before selected child 10 is printed.

2. [3 marks] On drawing above right, show MCTS tree after sim 11. If needed, add node(s). Label nodes.

\$ Below is tree after sim 10. Above right is tree after sim 11.



3. [3 marks] Below is the and-or tree for and-or expression $b2 \wedge (b1 \vee c1) \wedge (a3 \vee b3)$. Below right, draw the and-or tree for expression $S = c1 \wedge (c2 \wedge (c3 \vee b3) \vee a3 \wedge (b2 \vee a2 \wedge (b1 \vee a1)))$.



4. [.5+.5+1+1 marks] Consider 3×3 Hex. For a),b),c), assume black follows S from the previous question as a 1st-player strategy.

a) If white's first move is to cell c3, where does black play next?

\$ After 1.B[c1], B follows remaining substrategy $T = (c2 \wedge (c3 \vee b3) \vee a3 \wedge (b2 \vee a2 \wedge (b1 \vee a1))) = (U \vee V)$.

After 2.W[c3], B follows the substrategy not containing c3, so V .

So 3.B[a3]

b) If white's first move is to cell a1, where does black play next?

After 1.B[c1], B follows remaining substrategy $T = (U \vee V)$.

After 2.W[a1], B follows the substrategy not containing a1, so U .

So 3.B[c2]

next questions: 1 mark for correct answer, $-.5$ marks for wrong answer, 0 marks for no answer

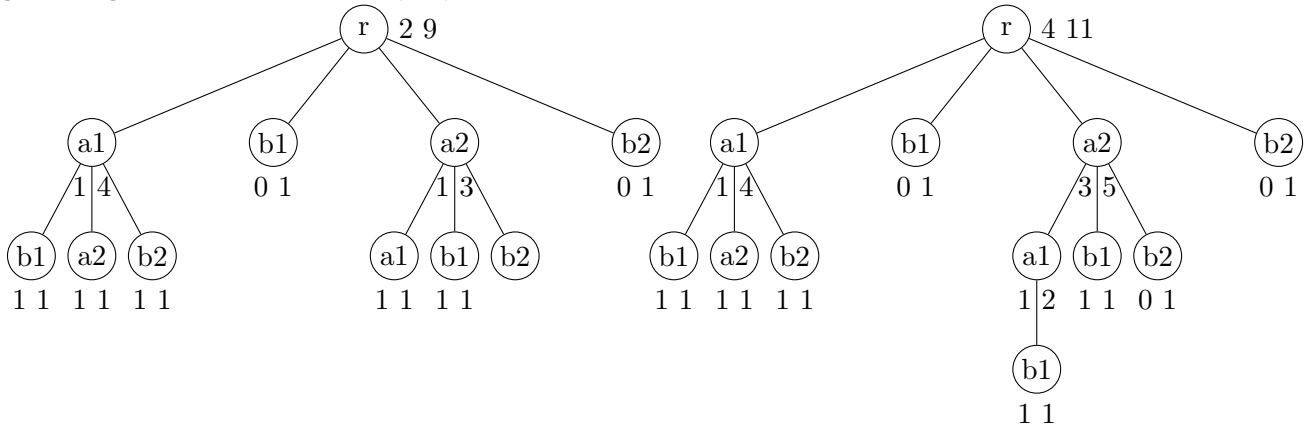
\$ c) Black wins against (circle one of i,ii,iii) i) all 2nd-player white strategies.

\$ d) If white follows S , white wins against

(circle one of i,ii,iii) ii) some but not all 2nd-player black strategies.

answers

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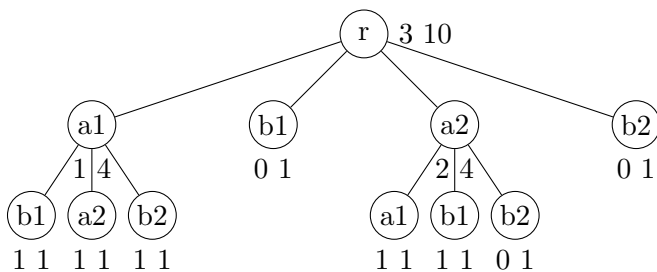
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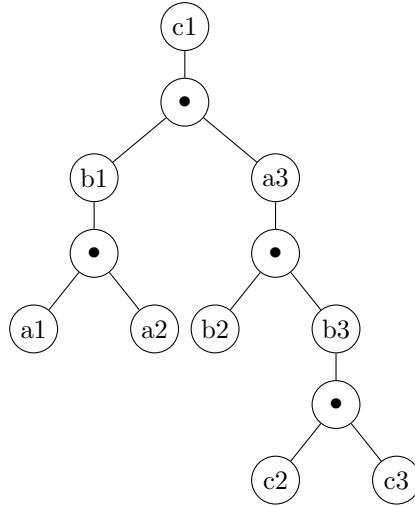
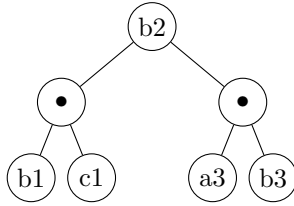
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So 3.B[b1].

b) If white's first move is to cell a1, where does black play next?

After 1.B[c1], B follows remaining substrategy $T = (U \vee V)$.

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So 3.B[a3].

next questions: 1 mark for correct answer, $-.5$ marks for wrong answer, 0 marks for no answer

\$ c) Black wins against (circle one of i,ii,iii) ii) some but not all 2nd-player white strategies.

\$ d) If white follows S , white wins against (circle one of i,ii,iii) iii) all 2nd-player black strategies.