Questions:

Restriction of costs to positive values:

a) Why would an optimal algorithm need to expand the whole space (in case of possible negative rewards) ?
Otherwise the agent cannot guarantee that there are no negative (highly rewarding) paths even in less promising branches.

b) Does a restriction to c(n,a,n‘) > min (negative val.) help?
   - In case of trees and in case of graphs?

In case of trees: yes, if there is a maximum depth, some branches don‘t need to be visited as even with maximum reward in the remaining levels, the current best path cannot be improved

In case of graphs: no, loops with negative rewards are possible

Questions:

Restriction of costs to positive values:

c) Assume there are loops and the world state is the same after a finite number of actions. What is the optimal strategy in case of negative path costs for all actions?
   Loop forever, this increases the reward each time.

d) Are there negative costs in real life?
   Yes, e.g., a detour to a cheap gas station can be rewarding

Questions:

True or false? Why?

a) Depth-first expands always at least as many nodes as A* with an admissible heuristic
False, depth-frist may be lucky to find immediately the optimal path, A* has to consider alternatives to ensure optimality.

b) For the 8-puzzle, *h(n)* =0 is admissible.
True, *h(n)* =0 is always admissible (*h* is non-negative and never overestimates).

c) A* is not suitable for robotics, because percepts, actions, and states deal with contiuous values.
False, the continuous spaces can be discretized. A* (or variants) are widely used, e.g., for navigation.

Questions:

True or false? Why?

d) In chess, a rook (Turm) can move only horizontally or vertically, but not jump over other chessmen. The manhatten distance is admissible for a move from A zu B.
False, if there are no other chessmen, for a straight line across the chess board one move is sufficient, but the manhattan distance is 7, i.e., the manhattan distance overestimates.

Questions:

In graph-based A*, there can be state spaces with suboptimal solutions if *h* is admissible, but not consistent. Show an example.