

- b. (6 points) Suppose the goal state is 7. Perform iterative deepening depth first search to solve the problem. For each step, clearly label the content of the frontier, the node being expanded, and the current arrangement of the search tree.

| Step | Depth | Frontier | Tree Arrangement |
|------|-------|--------------------|--|
| 1 | 1 | ① | 1 $\xrightarrow{2n}$ 2 |
| 2 | 1 | ②, 1 | 1 $\xrightarrow{2n}$ 2 |
| 3 | 1 | ① | 1 $\xrightarrow{2n}$ 2 1 $\xrightarrow{2n+1}$ 3 |
| 4 | 1 | ③, 1 | 1 $\xrightarrow{2n}$ 2 1 $\xrightarrow{2n+1}$ 3 |
| 5 | 1 | ① | 1 $\xrightarrow{2n}$ 2 1 $\xrightarrow{2n+1}$ 3 1 $\xrightarrow{2n+3}$ 5 |
| 6 | 1 | ⑤, 1 | 1 $\xrightarrow{2n}$ 2 1 $\xrightarrow{2n+1}$ 3 1 $\xrightarrow{2n+3}$ 5 |
| 7 | 2 | ① | 1 $\xrightarrow{2n}$ 2 |
| 8 | 2 | ②, 1 | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 |
| 9 | 2 | ④, 2, 1 | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 |
| 10 | 2 | ②, 1 | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 1 $\xrightarrow{2n+1}$ 3 |
| 11 | 2 | ⑤, 2, 1 | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 1 $\xrightarrow{2n+1}$ 3 $\xrightarrow{2n}$ 5 |
| 12 | 2 | ②, 1 | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 1 $\xrightarrow{2n+1}$ 3 $\xrightarrow{2n+1}$ 5 1 $\xrightarrow{2n+3}$ 7 |
| 13 | 2 | ⑦, 2, 1 GOAL!!! | 1 $\xrightarrow{2n}$ 2 $\xrightarrow{2n}$ 4 1 $\xrightarrow{2n+1}$ 3 $\xrightarrow{2n+1}$ 5 1 $\xrightarrow{2n+3}$ 7 |

Notation:

- Circled numbers on the Frontier are the nodes which are being expanded.
- Arcs on the tree arrangement are labelled with the action which leads the parent state to the child state.