1993 Paper 8 Question 7

Artificial Intelligence I

A sliding-tile puzzle consists of three black tiles, three white tiles and an empty space, thus:

| B_1 | B_2 | B_3 | | W_1 | W_2 | W_3 |

There are three legal ways of moving a tile, each with an associated cost:

    slide into the adjacent empty location — cost 1

    jump over one tile into the empty location — cost 1

    jump over two tiles into the empty location — cost 2

The goal is to have all the white tiles to the left of all the black tiles and to achieve this at minimum cost. The final position of the empty space is not important.

(a) Represent the problem using the following knowledge representation schemes:

    (i) production system rules   [5 marks]

    (ii) a semantic network   [5 marks]

    In one sentence, describe the different emphases of these two schemes.
                                                             [1 mark]

(b) State two possible heuristics to help solve this problem.   [2 marks]

(c) For a planner to solve this puzzle, what operators (i.e. planning actions) would be needed?   [7 marks]