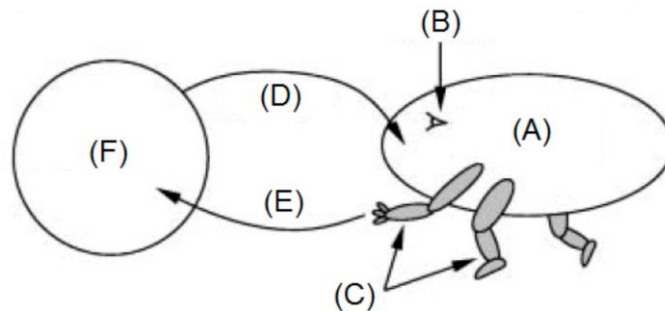一、(5 分)以下敘述是否正確？請說明理由：The Turing test evaluates a computer system's ability to act rationally.

二、(12 分) Rational agents are often specified by a PEAS description. What do each of the letters in "PEAS" stand for?

三、(12 分) What does each of the lettered items in the following diagram represent?

四、(10 分) What must be true about a heuristic in order to call it admissible? What must be true about a heuristic in order to call it consistent?

五、(60 分，每小題各 5 分) The eight-puzzle consists of eight square tiles labeled 1 through 8 mounted in a board with three rows and three columns. The problem posed is to move the tiles in a scrambled puzzle back to their final position, as shown below.
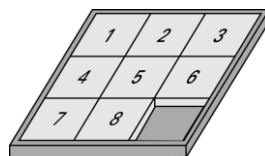
A heuristic for solving the eight-puzzle is to measure the distance each tile is from its destination and add these values to obtain a single quantity. A tile immediately adjacent to its final destination would be associated with a distance of one, whereas a tile whose corner touches the square of its final destination would be associated with a distance of two. We can use the greedy best-first search algorithm to solve this problem. Let us apply this algorithm from the following initial configuration.

1	3	5
4	2	
7	8	6

First, we establish this initial state as the root node and record its heuristic value, which is five. Then, the first pass adds three nodes that can be reached from the initial configuration. The second pass adds one node that can be reached from the leftmost node with the smallest heuristic value, which is four. The following two figures show the search trees after one pass and two passes, respectively.
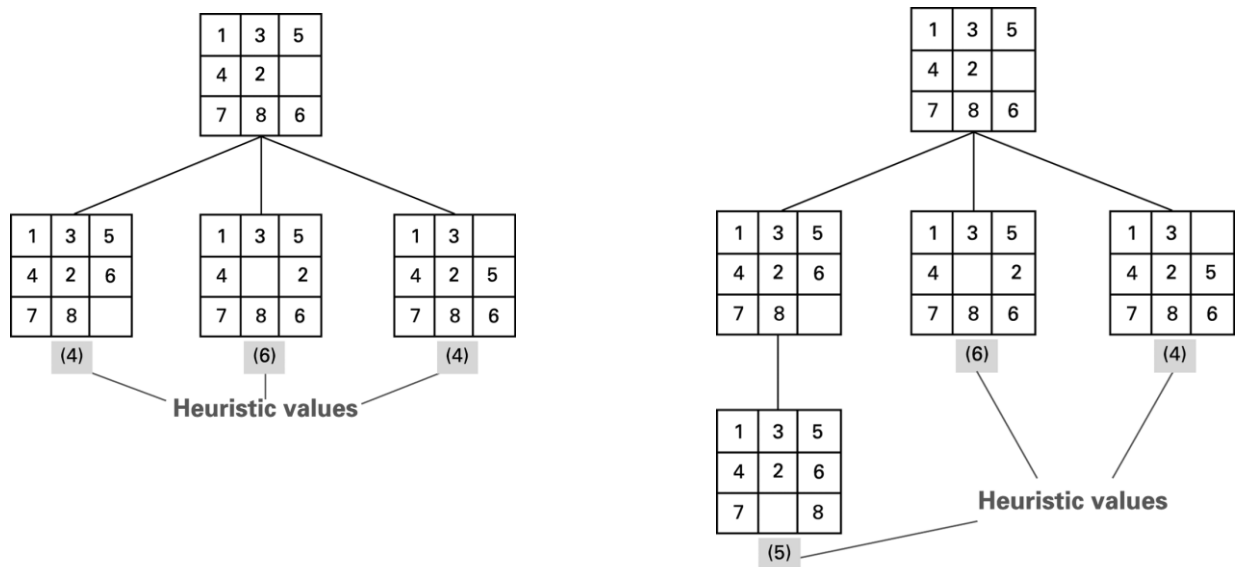
Note that we have recorded the heuristic value of each leaf node in parentheses beneath the node.

(a) Please state the reason why the heuristic value of the initial state is five.

(b) Please show the search tree after three passes.

(c) Please show the search tree after four passes.

(d) Applying this greedy best-first search algorithm, what is the solution of the above example?

(e) A simpler heuristic in the case of the eight-puzzle would be to estimate the "distance" to the goal by counting the number of tiles that are out of place. Please show how the greedy best-first search algorithm works using this simpler heuristic on the above example.

(f) Rather than building the search tree in a greedy best-first manner, one can build it using the A* search algorithm. Please show how the A* search algorithm works using the above example.

(g) Rather than building the search tree in a greedy best-first manner, one can build it using the breadth-first approach. Please show how the breadth-first approach works using the above example.

(h) One can also build the search tree using the depth-first approach. Please show how the depth-first approach works using the above example.

(i) One can also build the search tree using the IDA* approach. Please show how the IDA* approach works using the above example.

(j) One can also build the search tree using the hill-climbing search approach. Please show how the hill-climbing search approach works using the above example.

(k) Hashing is a technique that allows a record to be located by means of a key value. Please design a hash function for the eight-puzzle configurations.

(l) What are the major advantages of hashing when it is used in the eight-puzzle problem?

六、（10 分）How does the simulated annealing algorithm behave at very high temperatures, and how it behaves at very low temperatures?

七、（10 分）在 local beam search algorithm 中，如果 k 值設定為 1，則會變成那一種演算法？

八、（10 分）在 genetic algorithm 中，如果省略掉 crossover operators，則此 genetic algorithm 的行為會變成怎麼樣？