1. Question 1
    a.
        i. Agent: an entity that perceives and acts; or, one that can be viewed as perceiving and acting. [3 Marks:1.5 marks for mentioning perceiving 1.5 for mentioning acting.]

        ii. Uninformed, also called blind search strategies use only the information available in the problem definition. Examples Breadth-first search, Depth-first search [4 Marks: 1.5 marks for describing what uninformed search is, 2 marks for the two examples]

    b. [Book work and Applied knowledge]
        i. The components for the Mars rover are:
        Performance Measure: Amount of terrain explored and reported, samples gathered and analysed.
        Environment: Launch vehicle, lander, Mars.
        Actuators: Wheels/legs, sample collection device, analysis devices, radio transmitter
        Sensors: Camera, touch sensors, accelerometers, orientation sensors, wheel/joint encoders, radio receiver Mathematician's. [4 Marks, 1 for each component]

        ii. The environment is:
        Partially Observable: as it is not possible for the robot to have a complete vision of the whole terrain
        Stochastic: as it is not clearly determined what is going to be found in Mars.
        Continuous: movements and positions occur in a continuous space. The terrain is not a grid, but a real space.
        Single-Agent: there will be a single robot in Mars (hopefully!).
        [4 Marks: 2 for any of these 4]

    c. [Applied knowledge, problem solving]

        i. The required components are:
        Initial state: given
        Actions: There are four actions, which move the blank, Right, Left, Up, Down. (R, L, U, D)
        Goal test: compare with the goal state (given)
        Path cost: 1 per move

        [4 Marks, 1 for each component]

        ii. Depth-First-Search expanding 6 nodes by drawing the search tree
        [6 Marks: 1 for each level of the tree including enumeration of the stages, labelling of nodes and edges]

2. Question 2
    a. [Book work, but requires reasoned answers]:
        i. A search space is the set of potential solutions to a given optimisation problem. Example the set of all binary strings of a given length, for binary representation
            [3 marks: 1.5 for definition. 1.5 for example]
        ii. A neighbourhood is a set of solutions that are nearby a given solution. This can be defined according to a distance metric, such as Hamming distance for binary strings; or via a given search operator such as 1-bit flip. Examples 1-bit flip, 2-bitflip for binary representation. Swap or insert for permutation representation.
   [4 marks: 2 for definition, 2 for an example]
    b. [Applied knowledge and problem solving] To answer this question, the students need to realise that this is an instance of the travelling salesman problem
        i. Problem representation: a permutation of integers of length 10 (the number of clients). The permutation indicates the order in which the clients will be visited [2 marks: 2 for indicating the solution representation, 2 for indicating how it is interpreted]
        ii. Objective function: Minimise the total distance travelled. That is, minimise the sum of the pairwise distances between the client locations [4 marks: 2 for indicating minimisation of distances, 2 for describing that the sum of pairwise distance needs to be considered]

    c. [Applied Knowledge]
        i.
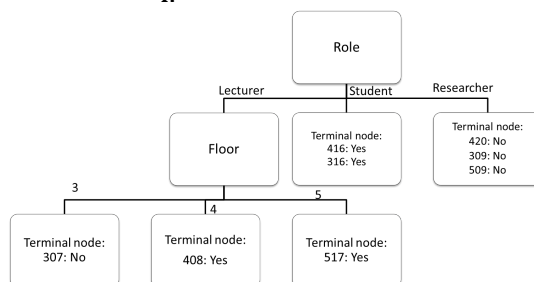
[6 Marks: 3 for each level of the tree correctly constructed. The depth of the tree should be two. At each level, 3 nodes should indicated.]

        ii. No it is not the only one; you can generate a tree of the same size (depth) by selecting 'Subject' as the 2nd attribute. Selecting 'Size' as the 2nd attribute does not work, as it will require an additional question to classify the examples.

        [4 Marks: 2 for the right answer, 2 for justification]