

Exercise;

- 1.1-1 A real-world example can be going shopping for items. One can write a list of items to buy and to make it efficient and more organized, the list can be sorted using different criteria such as alphabetical order, the quantity of items or where the items are placed in the shopping centre. Assuming that a parent is trying to find the nearest school to take their child after moving to a new location. All schools in the vicinity are mapped and the distance from the current location to all the schools is calculated, the distance can then be calculated and then sorted in order from the most or least distance to your current location. The shortest distance is then chosen.
- 1.1-2 In a real-world setting, organization can be considered, constraints like unforeseen trouble and costs.
- 1.1-3 I have seen a hash table in form of a dictionary. The data structure stores key-value pairs where the word is the key and its definition is the value. An advantage is there is efficient search as there is an average case time complexity for searching, inserting and deleting. A disadvantage can be two keys or two words hash to the same index causing a collision though in a dictionary one word can have a different pronunciation thus changing its meaning.
- 1.1-4 Both the shortest path and traveling-salesperson problems aim to find the best possible path based on specific criteria.
Differences include;
In the shortest path, it involves finding the shortest path between a single pair of nodes but in the case of the travelling salesperson, it involves a closed loop.
There are so many algorithms to find the shortest paths but there is no known efficient algorithm for large instances.
- 1.1-5 -Life threatening problems such as medical problems can only work with the best solution because an inaccurate solution can lead to death.
-Finding the best path to a location can work with the approximately the best solution because the goal is just to minimize resources and improve efficiency.
- 1.1-6 Stock trading where a trader needs to decide when to buy and sell stocks to maximise profits sometimes the data is available to be analysed and make the right decision such as market trends and historical stock prices.

At other times, new events and real-time market data can influence stock prices and require traders to adjust strategies.