MODULE L STANDARD ALGORITHMS · L1

Linear search

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 2.1.3

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **21 marks**. Code is written in OCR Exam Reference Language. Arrays start at index 0. All codes on this sheet are made up.

1

Total: 4 marks

(a) Tick (✓) **one** box in each row to show whether each statement about a linear search is true or false. **[4]**

Statement	True	False
A linear search starts by checking the first item in the list.		
The data must be sorted before a linear search can be used.		
A linear search can stop as soon as the item it is looking for is found.		
A linear search checks the middle item of the list first.		

2

Total: 3 marks

(a) Describe the main steps of a linear search. **[3]**

3

Total: 4 marks

A warehouse robot stores the shelf codes it can reach in the array `shelves`. The codes are in no particular order.

Index	0	1	2	3	4	5	6	7
shelves	P41	C08	R17	D55	C08	H23	M90	B12

(a) The robot uses a linear search that stops when the item is found to look for `"D55"`. List, in order, every shelf code that is compared with `"D55"`. **[2]**

(b) State the index at which `"D55"` is found. **[1]**

(c) The robot then uses a linear search that stops when the item is found to look for `"C08"`. State the index at which `"C08"` is found. **[1]**

4 **Total: 7 marks**

A program checks whether a sensor ID typed in by an engineer is stored in the array `sensors`.

```
01 sensors = ["S4", "S9", "S2", "S7", "S2"]
02 target = input("Enter sensor ID")
03 found = False
04 i = 0
05 while i < 5 AND found == False
06     if sensors[i] == target then
07         found = True
08     else
09         i = i + 1
10     endif
11 endwhile
12 if found == True then
13     print("Found at index " + str(i))
14 else
15     print("Not found")
16 endif
```

(a) Identify the standard searching algorithm used in this program. **[1]**

(b) Identify the line number where an item in the array is compared with the target. **[1]**

(c) State the purpose of the variable `found` in this program. **[1]**

(d) The engineer enters `S2`. Complete the trace table for the program. You may not need to use all the rows. **[3]**

Line number	i	found	Output

(e) State what the program outputs if the engineer enters `S5`. **[1]**

5 **Total: 3 marks**

A delivery company stores 50 000 parcel records in no particular order. A linear search is used to find the record for one parcel.

(a) State the greatest number of records the linear search might need to check. **[1]**

(b) Describe the **two** situations in which the linear search would need to check this many records. **[2]**

1

2

Total for this worksheet: 21 marks