MODULE L STANDARD ALGORITHMS · L1

Linear search: mark scheme

21 marks · OCR J277 spec 2.1.3 (searching algorithms: linear search), with 2.1.2 (trace tables)

How to use. 1 mark per bullet up to the Max shown. **/** separates alternative answers. Words in (brackets) are not needed for the mark. Students are not expected to remember the code for a linear search (J277 2.1.3 "Not required"); Q4 gives the code.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 2.1.3	Starts by checking the first item: True Data must be sorted first: False Can stop as soon as the item is found: True Checks the middle item first: False	**4**	1 mark per correct row. Two ticks in a row: 0 for that row. Row 2: linear search has no pre-requisite; it works on unsorted data. Row 4 describes a binary search.
2(a) J277 2.1.3	Start at the first item (in the list) Compare the (current) item with the item being searched for / target If they match, the item is found / stop (and give its position) If not, move to the next item (in order) Repeat until the item is found / until the end of the list is reached If the end of the list is reached with no match, the item is not in the list / output not found	**3**	Max 3. Steps must be described, not just the result: "it looks through the list" alone = 0. Do not accept steps of a binary search (middle item, discard half). Credit any other valid step of a linear search.
3(a) J277 2.1.3	P41, C08, R17 (compared first, in this order) ... ... then D55, and no further codes	**2**	Order must be correct. Listing any code after D55 (e.g. the second C08): max 1. Accept indexes 0, 1, 2, 3 if clearly linked to the codes.
3(b) J277 2.1.3	3	**1**	Do not accept 4 (that is the position counting from 1, not the index).
3(c) J277 2.1.3	1	**1**	The search stops at the first match, so index 4 is never reached. Do not accept 4, or "1 and 4".
4(a) J277 2.1.3	Linear search	**1**	Accept "linear" by itself. Do not accept "linear sort" or "binary search".

QUESTION	ANSWER	MARKS	GUIDANCE
4(b) J277 2.1.3	(Line) 06 / 6	**1**	Do not accept line 05 (it compares `i` and `found`, not an item with the target).
4(c) J277 2.1.3	To record / show whether the target has been found (yet) To stop the loop / search once the target is found	**1**	Max 1. Accept "it is a flag (that shows if the sensor ID was found)". Do not accept "to store the sensor ID" / "to store the index".
4(d) J277 2.1.3, 2.1.2	`i`: 0, 1, 2 (in order) `found`: False, True (in order) Output: Found at index 2	**3**	1 mark per correct column. Values may be repeated on later rows. Line numbers are not marked. A blank cell means no change. Accept 0/1 or F/T for False/True. Output: ignore quotation marks; do not accept extra outputs. Example: line 03 found False; 04 i 0; 09 i 1; 09 i 2; 07 found True; 13 output Found at index 2.
4(e) J277 2.1.3	Not found	**1**	Ignore quotation marks. Do not accept "Found at index 5" or any index.
5(a) J277 2.1.3	50 000	**1**	Accept "all of them / every record" only with the number 50 000 or clear equivalent (all 50 000).
5(b) J277 2.1.3	The record being searched for is the last one in the list / at the end The record being searched for is not in the list (so every record is checked before reporting not found)	**2**	1 mark each. Do not accept "the list is not sorted" (linear search checks items in order whether sorted or not) or "the list is very big" alone.

Total: 21 marks