1D Arrays – BatteryCharger FRQ

AP® COMPUTER SCIENCE A

GENERAL SCORING GUIDELINES

Apply the question assessment rubric first, which always takes precedence. Penalty points can only be deducted in a part of the question that has earned credit via the question rubric. No part of a question (a, b , c) may have a negative point total. A given penalty can be assessed only once for a question, even if it occurs multiple times, or in multiple parts of that question. A maximum of 3 penalty points may be assessed per question.

1-Point Penalty

(w) Extraneous code that causes side effect (e.g. printing to output, incorrect precondition check)

(x) Local variables used but none declared

(y) Destruction of persistent data (e.g., changing value referenced by parameter)

Mr Lee's 1-Point Penalty:

- Inefficient, "long winded" or "messy" difficult to understand code which takes longer to write than standard more efficient solutions.
    - In an exam you need to save time by writing quickly hand writable efficient code which is easy for AP readers to understand.

No Penalty

- Extraneous code with no side effect (e.g., precondition check, no-op)
- Spelling/case discrepancies where there is no ambiguity*
- Local variable not declared provided other variables are declared in some part
- Keyword used as an identifier
- Common mathematical symbols used for operators (x • ÷ ≤ ≥< > ≠)
- `[ ]` vs. `( )`
- Extraneous [ ] when referencing entire array
- `[i,j]` instead of `[i] [j]`
- = instead of == and vice versa
- Missing `{}` where indentation clearly conveys intent
- Missing `()` around `if` or `while` conditions

** Spelling and case discrepancies for identifiers fall under the "No Penalty" category only if the correction can be unambiguously inferred from context; for example, "total" instead of "totl". As a counterexample, that if the code declares "int G=99 , g=O; ", then uses "while (G < 10) " instead of "while (g < 10) ", the context does not allow for the reader to assume the use of the lower-case variable.*

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An electric car that runs on batteries must be periodically recharged for a certain number of hours. The battery technology in the car requires that the charge time not be interrupted.

The cost for charging is based on the hour(s) during which the charging occurs. A rate table lists the 24 one-hour periods, numbered from 0 to 23, and the corresponding hourly cost for each period. The same rate table is used for each day. Each hourly cost is a positive integer. A sample rate table is given below.

Hour	Cost
0	50
1	60
2	160
3	60
4	80
5	100
6	100
7	120

Hour	Cost
8	150
9	150
10	150
11	200
12	40
13	240
14	220
15	220

Hour	Cost
16	200
17	200
18	180
19	180
20	140
21	100
22	80
23	60

A rate table is used to determine the most economic time to charge the battery.

```
/** rateTable has 24 entries representing the charging costs for hours
 *  0 through 23.
 */
int[] rateTable;
```

Write a code segment that prints the total cost to charge a battery given the hour at which the charging process will start and the number of hours the battery needs to be charged.
For example, using the rate table above, the following table shows the resulting costs of several possible charges.

Start Hour of Charge	Hours of Charge Time	Last Hour of Charge	Total Cost
12	1	12	40
0	2	1	110
22	7	4 (the next day)	550
22	30	3 (two days later)	3,710

Note that a charge period consists of consecutive hours that may extend over more than one day.
Complete method code segment below.

```
/**
* Determines the total cost to charge the battery starting at the beginning
* of startHour.
* @param startHour the hour at which the charge period begins
*       Precondition: 0 <= startHour <= 23
* @param chargeTime the number of hours the battery needs to be charged
*       Precondition: chargeTime > 0
* @print the total cost to charge the battery
*/
int startHour, chargeTime;
```