1D Arrays – Sound 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.*

1D Arrays – Sound FRQ

Digital sounds can be represented as an array of integer values. For this question, you will write two unrelated code segments of the Sound class.

```
/** the array of values in this sound; guaranteed to be
 *  valid ints */
int [] samples;
```

(a) The volume of a sound depends on the amplitude of each value in the sound. The amplitude of a value is its absolute value. For example, the amplitude of -2300 is 2300 and the amplitude of 4000 is 4000.

Write a code segment that will change any value that has an amplitude greater than the given limit. Values that are greater than `limit` are replaced with `limit`, and values that are less than `–limit` are replaced with `–limit`. The code segment prints the total number of values that were changed in the array. For example, assume that the array `samples` has been initialized with the following values.

40	2532	17	-2300	-17	-4000	2000	1048	-420	33	15	-32	2030	3223

When the code segment is executed the value 5 will be printed and the array `samples` will contain the following values.

40	2000	17	-2000	-17	-2000	2000	1048	-420	33	15	-32	2000	2000

Complete the code segment below.

```
/** Changes those values in this sound that have an
 *  amplitude greater than limit.
 *  Values greater than limit are changed to limit.
 *  Values less than -limit are changed to -limit.
 *  @param limit the amplitude limit
 *         Precondition: limit >= 0
 *  @print the number of values in this sound that this
 *  code segment changed
 */

int limit;
```

(b) Recorded sound often begins with silence. Silence in a sound is represented by a value of 0.

Write a code segment that removes the silence from the beginning of a sound. To remove starting silence, a new array of values is created that contains the same values as the original samples array in the same order but without the leading zeros. The variable *`samples`* is updated to refer to the new array. For example, suppose the instance variable *`samples`* refers to the following array.

Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0	0	0	0	-14	0	-35	-39	0	-7	16	32	37	29	0	0

After the code segment has been executed, the variable samples will refer to the following array.

Index	0	1	2	3	4	5	6	7	8	9	10	11
Value	-14	0	-35	-39	0	-7	16	32	37	29	0	0

Complete the code segment below.

```
/** Removes all silence from the beginning of this sound.
 *  Silence is represented by a value of 0.
 * Precondition: samples contains at least one nonzero value
 * Postcondition: the length of samples reflects the removal
 * of starting silence
 */
```