Study Guide Project Improvement

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In this project, we display questions and answer them. If the answer is correct, we display true, otherwise, we display false. This project can serve as a study guide for our courses or Civics (History and Government) Questions for the Naturalization Test, as in `https://www.uscis.gov/sites/default/files/document/questions-and-answers/100q.pdf`.

Warning:

1. These are copyrighted materials and cannot be uploaded to the Internet.
2. Only ask help from teaching staff of this course.
3. Use solutions from ChatGPT or online tutoring websites like, but not limited to, chegg.com, violates academic integrity and is not allowed.

1 Task A: organize the program into functions

Motivation: In previous tasks, we put every code in main function. Also, we enter a file name and read its contents. We may need to read several files, for example,
`cs135_midterm_f24_v1.txt` and `cs135_midterm_f24_v2.txt`.
Then add the questions to an array of Questions.
In Task A, we do the following.

1. Name your source code `checkAnswer_function.cpp`.
2. Define function

   `void read_file(string fileName, Question ques[], int capacity, int& size);`

   Note that the return type is void, but the size of the array may be increased after reading a file, so size needs to be passed by reference. See the & near type `int` for parameter size?

   (a) Given struct Question as follows.

```
struct Question {
    string text; //question text
    string answer;
    string explanation;
    string version;
    string type;
    string label;
};
```

(b) Read a file whose name is saved in `fileName`.

(c) Read each question in the file, if the current size Question array `ques` does not equal to the `capacity` of the array, add to the end of the array. Increase the current size by 1.

3. Download **link to cs135 midterm f24 v1**.

4. Download **link to cs135 midterm f24 v2**.

5. Download **link to cs135 midterm s24 v1**.

6. Define `void display(Question ques[], int size)` function, which displays the fields of each question in array `ques`. You need to fill in the ... parts.

```
void display(Question ques[], int size) {
    for (int i = ...; i < ...; ...) {
        cout << i + 1 << endl; //start labeling from 1

        //display question text of the ith question
        cout << "question: " << ... << endl;

        //display answer of the ith question
        cout << "answer: " << ... << endl;

        //display explanation of the ith question
        cout << "explanation: " << ... << endl;
        cout << "type: " << ... <<  endl;
        cout << "version: " << ... <<  endl;
        cout << "label: " << ... <<  endl;
        cout << endl;
    }
}
```

7. In main function, test `read_file` function as follows.

```
int main() {
    const int CAPACITY = 1000;
    Question ques[CAPACITY]; //question array

    int size = 0;

    //TODO: call read_file for "cs135_midterm_f24_v1.txt",
    //save the questions in array ques if the capacity is not yet reached.

    //TODO: call read_file for "cs135_midterm_f24_v2.txt",
    //save the questions in array ques if the capacity is not yet reached.

    //TODO: call read_file to read "cs135_midterm_s24_v1.txt"

```

```
    //TODO: call display function on array ques.
    //Do not forget to pass the size of array ques,
    //that is, the number of elements in ques,
    //as the second parameter.

    return 0;
}
```

Here is a sample output (the number of empty lines between fields might be a little different).

```
1
question: Given char arr[] = {'A', 'B', 'C'}, what is arr[1]?
answer: 'B'
explanation: arr[1] is the second element of array arr, which is 'B' in this
   example.

type: array
version: f24 v1
label: 1.1

2
question: Declare function increase, given an integer array arr with size many
   elements, increase each element of the array by 1. Return type is void. Define
   the function header (no implementation is needed).
answer: void increase(int arr[], int size);
explanation: (1) the first parameter is int arr[], the name of array arr, which
   also implies the address of the first element of array.
(2) the second parameter represents the number of elements of the array.

type: function; array
version: f24 v1
label: 1.2

3
question: Assume that n is properly declared and initialized. Write a statement to
   declare lastDigit as an integer and initialize it to be the least significant
   digit of integer n. Suppose n is 123, after the statement, lastDigit is 3.
answer: int lastDigit = n % 10;
explanation: (1) operator % is called remainder or modular operator.
(2) For example, 12 % 10 means the remainder when dividing 12 pens among 10
   students, each student gets 1 pen, and there are 2 pens left.
(3) In general, n % 10 returns the last digit, or the rightmost digit (least
   significant digit), of n.
(4) int lastDigit = n % 10; is a statement to declare lastDigit as an int and
   initialize it by the last digit of n.

type: arithmetic; modular; remainder
```

```
version: f24 v1
label: 1.3

... //omit the contents

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question: What is the output for the following code?
#include <iostream>
using namespace std;

void foo(int& a, int b);

int main() {
    int i = 1;
    int j = 3;
    foo(i, j);
    cout << "i = " << i
         << ", j = " << j << endl;

    return 0;
}

void foo(int& a, int b) {
    a++;
    b--;
}


answer: i = 2, j = 3
explanation:
type: function; pass by value; pass by reference
version: s24 v1
label: 1.9

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question: Write a condition to represent that char variable ch is none of the
   following: 'a', 'b', or 'c'.
answer: (ch != 'a' && ch != 'b' && ch != 'c')
explanation: another solution is (! (ch == 'a' || ch == 'b' || ch == 'c'))

type: condition
version: s24 v1
label: 1.10
```