Midterm of CS 135, v1
Mar 18, 2024

Name:	
EmpID:	

1 (30 points) Answer the following questions.

(1) Given `string arr[] = {"Hello", "Hi", "Hey"}`, what is arr[2]?

Answer: arr[2] is `"Hey"`.

(2) Declare function **remove**, for an given array `arr` of integers, an integer called `size`, which represents the number of elements in the array, and an integer called `target`, search whether target is in the array or not, if yes, then remove the target from the array, and the size is reduced by 1, otherwise, do nothing and no change to the original size. Return type is void.

Answer: `void remove(int arr[], int& size, int target)`

(3) Write a statement to generate a random int in [-2, 3]. No need to include libraries.

Answer: `rand() % 6 -2`

(4) Given `string greeting = "Wonderful";` What is the value for greeting.substr(4, 2)?

Answer: er

(5) What is the value of 1 / 3 * 2?

Answer: 0

(6) Suppose n is 2341, what the value of foo(n)?

```
int foo(int n) {
   int result = 0;
   do {
       result += n % 10;
       n /= 10;
   } while (n != 0);

   return result;
}
```

Answer: 10

(7) Given two double variables a and b, find out the return of a^b. Hint: use pow function, see cheat sheet paper.

Answer: pow(a, b);

(8) What is the output of the following code?

```
#include <iostream>
using namespace std;

int main() {
    int count = 0;
    for (int i = -6; i < 2; i += 3)
        count++;

    cout << count << endl;
    return 0;
}
```

Answer: 3

(9) 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

(10) 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')` or `! (ch == 'a' || ch == 'b' || ch == 'c')`

2 (20 points) Answer the following questions.

(1) What is the output of the following code?

```
#include <iostream>
#include <string>
using namespace std;

void show(int height, int width);

int main() {
    show(4, 6);
    return 0;
}

void show(int height, int width) {
    for (int row = 0; row < height; row++) {
        for (int col = 0; col < width; col++)
            if (row < height/2 && col < width/2)
               cout << "*";
            else cout << "-";

        cout << endl;
    }
}
```

Answer:

```
***---
***---
------
------
```

(2) Define function `all_big_letters`, for an array of chars, return true if **all** its elements are bigger letters ('A' to 'Z'), otherwise, return false. **No need to include libraries or define main function.**

Hint: you may use `int isupper(int ch)` to test whether a character is upper letter or not.

Answer:

```
#include <iostream>
#include <string>
using namespace std;

bool all_big_letters(char arr[], int size);

int main() {
    char arr[] = {'A', 'B', 'C'};
    int size = sizeof(arr) / sizeof(arr[0]);
    cout << boolalpha << all_big_letters(arr, size) << endl;
```

```
11
12      char arr2[] = {'A', 'B', 'C', 'd'};
13      int size2 = sizeof(arr2) / sizeof(arr2[0]);
14      cout << boolalpha << all_big_letters(arr2, size2) << endl;
15
16      return 0;
17  }
18
19  bool all_big_letters(char arr[], int size) {
20      for (int i = 0; i < size; i++)
21          if ( !(arr[i] >= 'A' && arr[i] <= 'Z') )
22             return false;
23
24      return true;
25  }
```

3 (50 points) Programming exercises

(1) Define function called `tally`, for an array of integers, calculate the number of positive integers, negative integers, and zeros, then return the maximum of these three numbers. For example, if the array has elements 1, -2, 3, 2, 0, the return is 3.

Answer:

```
#include <iostream>
#include <string>
using namespace std;

int tally(int arr[], int size);

int main() {
    int arr[] = {1, -2, 3, 2, 0};
    int size = sizeof(arr) / sizeof(arr[0]);
    cout << tally(arr, size) << endl;
    return 0;
}

int tally(int arr[], int size) {
   int numPos = 0;
   int numNeg = 0;
   int numZeros = 0;
   for (int i = 0; i < size; i++)
       if (arr[i] > 0)
          numPos++;
       else if (arr[i] < 0)
              numNeg++;
           else numZeros++;

   int max = numPos;
   if (numNeg > max)
      max = numNeg;
   if (numZeros > max)
      max = numZeros;

   return max;
}
```

In main function, declare array `arr` with values 1, -2, 3, 2, 0, and call the above function on `arr`. Print out the return. **Just write the statements in main function, no need to include libraries**.

Answer:

```
    int arr[] = {1, -2, 3, 2, 0};
    int size = sizeof(arr) / sizeof(arr[0]);
    cout << tally(arr, size) << endl;
```

(2) Write code in main to enter strings (may contain spaces) until user enter "quit". Tally how many string has even number of characters.

Here is a sample input/output. `Enter a series of strings until enter "quit"` is a prompt. Strings `No, no` and `ABC DE` are even length strings.

```
Enter a series of strings until enter "quit"
No, no
try
ABC DE
quit
number of even strings: 2
```

Answer:

```cpp
//sample input/output:
//Enter a series of strings until enter "quit"
//No, no
//try
//ABC DE
//quit
//number of even strings: 2

#include <iostream>
#include <string>
using namespace std;

int main() {
    cout << "Enter a series of strings until enter \"quit\"" << endl;
    string str;
    getline(cin, str);

    int numEvenStrs = 0;
    while (str != "quit") {
        if (str.size() % 2 == 0)
           numEvenStrs++;

        getline(cin, str);
    }

    cout << "number of even strings: " << numEvenStrs << endl;
    return 0;
}
```