CIS 180 – Programming in C / C++
Cstrings, Strings, and Structures Exercise

Answer questions 1 – 5 based on the declarations that follow. Assume that the include files ctype.h and string.h have been declared and all functions and macros in them are available for your use.

```c
char weather[7][10] = { "cloudy", "cold", "sunny", "hot", "warm", "overcast", "cool" };
char string[41];
char name[21] = "";
char forecast[26] = "Partly cloudy";
```

1. What would be the value of `weather[3]`?

2. What would be the value of `weather[5][2]`?

3. Write a C++ statement that would copy the string "overcast" in array `weather` to the array `string`.

   ```cpp
   strcpy (string, weather(5));
   ```

4. What is the length of the string stored in `name` (not including the NULL character)?

5. Write the statement(s) necessary to change `forecast` to "Partly cloudy and cool" using string function(s).

   ```cpp
   strcat (forecast, " and cool");
   ```

Answer questions 6 – 11 based on the structure declaration that follows.

```c
struct StudentData
{
    char StdName[41];
    int StdNumber;
    float StdGPA;
    float StdUnits;
};
```

6. Write the statement necessary to declare the variable `Student` of type `StudentData`.

   ```cpp
   StudentData student;
   ```

7. Write the statement(s) necessary to prompt the user to enter the student's name and get the input provided by the user and store it in the member `StdName` for `StudentData` structure variable `Student5`.

   ```cpp
   cin.getline (Student5.StdName, 41);
   ```
8. Write the statement necessary to declare sPtr to be a pointer to a StudentData structure type.

StudentData * sPtr;

9. Given that Student5 is a variable of type StudentData, write the C++ statement necessary to make the StudentData pointer sdPtr point to structure variable Student5.

sdPtr = &Student5;

10. Write the C++ statement that would display the value of the member StdNumber using the StudentData pointer variable sdPtr which has already been declared and points to a valid variable of type StudentData.

cout << sdPtr->StdNumber << endl; (*sdPtr).

11. Write the C++ statement that would display the value of the member StdGPA in StudentData structure variable Student8.

cout << Student8.StdGPA;

Answer questions 12 – 13 based on the declaration of the structure that follows.

struct Account
{
    double AcctBalance;
    int AcctPin;
    char AcctName[41];
};

12. Write a function prototype for function GetAcct that takes a variable of type Account and returns a value of type bool.

    bool GetAcct (Account);

13. Write the function prototype for function ChangePin that takes 2 arguments, an Account structure type, and an integer and that returns a structure variable of type Account.

    Account ChangePin (Account, int);

Answer questions 14 – 18 based on the declaration of the structure that follows.

struct vehicle
{
    char type[28];
    char model[21];
    int modelYear;
};

14. Declare Cars as an array of 3 elements of type vehicle.

    vehicle cars[3];
15. Declare ClassicCar as a structure variable of type vehicle. In the declaration for ClassicCar, use an initializer list to set the values of the members in ClassicCar to:

\[
\text{vehicle } \text{ClassicCar} = \{ \text{Ford}, \text{"Mustang"}, 1968 \};
\]

16. Which character macro would you use to determine if variable Letter of type char contains a digit (something in the range of '0' to '9')?

\[i\text{sdigit}\]

17. Which character macro would you use to determine if variable Letter of type char contains an uppercase character?

\[i\text{supe}\]

18. Given the declaration \[\text{char MyCollege[ ] = "Cerritos Community College District";}\] Write the C++ statement that would determine the length of the string MyCollege and store it in the integer variable Size.

\[\text{Size} = \text{strlen (MyCollege)};\]

19. Given the declaration of \[\text{char array MyCollege in question 18, write the C++ statement that you would use to change MyCollege to contain an empty string (a zero length string)?}\]

\[\text{MyCollege [0] = "\0";}\]

20. Given the declaration: \[\text{char string[10] = "hola";}\] Write the C++ statements necessary to capitalize the first letter in string using function toupper.

\[\text{string [0] = toupper (string [0])};\]

**Multiple Choice questions (circle the correct answer)**

21. The _____ function accepts a string as an argument and converts the string to a long integer.
   
   a. \text{atol}  
   b. \text{strlong}  
   c. \text{strtolong}  
   d. \text{stringlong}  
   e. None of these

22. Which expression converts the string "10" to the integer value 10?
   
   a. \text{itoa(10)}  
   b. \text{atol("ten")}  
   c. \text{atol("10")}  
   d. \text{itoa("ten")}  
   e. None of these

23. A practical application of the _____ function is to allow a user to enter a response of 'y' or 'Y' to a prompt.
   
   a. \text{tolower}  
   b. \text{toupper}  
   c. \text{a or b}  
   d. \text{ignorecase}  
   e. None of these
24. Passing a structure as a constant reference parameter to a function:
   a. can potentially result in changes to the structure's members.
   b. guarantees not to result in changes to the structure's members.
   c. will always change the structure's members.
   d. All of these
   e. None of these

25. Before a structure can be used, it must be
   a. declared
   b. deallocated
   c. initialized
   d. All of these
   e. None of these

26. The _________ allows you to access structure members in a program.
   a. structure access operator
   b. dot operator
   c. #include <structaccess.h> directive
   d. getmember macro
   e. None of these

27. A structure pointer contains:
   a. The address of a structure variable
   b. The dereferenced address of a structure tag
   c. The name and address of the structure tag
   d. The address of a structure tag
   e. None of these

True/False

28. T  When declaring a structure type (struct declaration) you cannot initialize the members in the structure.

29. T  Structures allow a programmer to define a new aggregate data type for use in a program.

30. T  A declaration of a structure may contain another structure type. This results in the creation of a nested structure.

aggregate versus abstract