Questions
Answers to these questions can be found in Appendix G.

1. A structure brings together a group of
a. items of the same data type.
b. related data items.
c. integers with user-defined names.
d. variables.

2. True or false: A structure and a class use similar syntax.

3. The closing brace of a structure is followed by a . semicolon

4. Write a structure specification that includes three variables—all of type int—called hrs, mins, and secs. Call this structure time.

```
struct time
{
int hrs;
int mins;
int secs;
};
```

5. True or false: A structure definition creates space in memory for a variable.
false; only a variable definition creates space in memory

6. When accessing a structure member, the identifier to the left of the dot operator is the name of
a. a structure member.
b. a structure tag.
c. a structure variable.
d. the keyword struct.

7. Write a statement that sets the hrs member of the time2 structure variable equal to 11.

```
time2.hrs = 11;
```

8. If you have three variables defined to be of type struct time, and this structure contains three int members, how many bytes of memory do the variables use together?
18 in 16-bit systems (3 structures times 3 integers times 2 bytes), or 36 in 32-bit systems

9. Write a definition that initializes the members of time1—which is a variable of type struct time, as defined in Question 4—to hrs = 11, mins = 10, secs = 59.

```
time time1 = { 11, 10, 59 };
```

10. True or false: You can assign one structure variable to another, provided they are of the same type.

11. Write a statement that sets the variable temp equal to the paw member of the dogs member of the fido variable.

temp = fido.dogs.paw;

12. An enumeration brings together a group of
a. items of different data types.
b. related data variables.
c. integers with user-defined names.
d. constant values.

13. Write a statement that declares an enumeration called players with the values B1, B2, SS, B3, RF, CF, LF, P, and C.
enum players { B1, B2, SS, B3, RF, CF, LF, P, C };
14. Assuming the enum type players as declared in Question 13, define two variables joe and tom, and assign them the values LF and P, respectively.
players joe, tom;
joe = LF;
tom = P;

15. Assuming the statements of Questions 13 and 14, state whether each of the following statements is legal.
a. joe = QB;
b. tom = SS;
c. LF = tom;
d. difference = joe - tom;
a. no
b. yes
c. no
d. yes
16. The first three enumerators of an enum type are normally represented by the values
0, 1, 2
17. Write a statement that declares an enumeration called speeds with the enumerators obsolete, single, and album. Give these three names the integer values 78, 45, and 33.
enum speeds { obsolete=78, single=45, album=33 };
18. State the reason that
enum isWord{ NO, YES };
is better than
enum isWord{ YES, NO };

. because false should be represented by 0

1. A function's single most important role is to
a. give a name to a block of code.
b. reduce program size.
c. accept arguments and provide a return value.
d. help organize a program into conceptual units.

2. A function itself is called the function definition

3. Write a function called foo() that displays the word foo.
Void foo(){cout<<"foo";}
4. A one-statement description of a function is referred to as a function declaration or a prototype

5. The statements that carry out the work of the function constitute the function body.

6. A program statement that invokes a function is a function call.

7. The first line of a function definition is referred to as the declarator

8. A function argument is
a. a variable in the function that receives a value from the calling program.
b. a way that functions resist accepting the calling program's values.
c. a value sent to the function by the calling program.
d. a value returned by the function to the calling program.

9. True or false: When arguments are passed by value, the function works with the original arguments in the calling program.

10. What is the purpose of using argument names in a function declaration?
To clarify the purpose of the arguments
11. Which of the following can legitimately be passed to a function?
a. A constant
b. A variable
c. A structure
d. A header file

12. What is the significance of empty parentheses in a function declaration?
Empty parentheses mean the function takes no arguments

13. How many values can be returned from a function?
one
14. True or false: When a function returns a value, the entire function call can appear on the right side of the equal sign and be assigned to another variable.

15. Where is a function's return type specified?
. at the beginning of the declaration and declarator
16. A function that doesn't return anything has return type void.

17. Here's a function:

```
int times2(int a)
{
return (a*2);
}
```

Write a main() program that includes everything necessary to call this function.

```
main()
{
int times2(int); // prototype
int alpha = times2(37); // function call
}
```

18. When an argument is passed by reference

a. a variable is created in the function to hold the argument's value.
b. the function cannot access the argument's value.
c. a temporary variable is created in the calling program to hold the argument's value.
d. the function accesses the argument's original value in the calling program.

19. What is a principal reason for passing arguments by reference?

to modify the original argument (or to avoid copying a large argument)

20. Overloaded functions

a. are a group of functions with the same name.
b. all have the same number and types of arguments.
c. make life simpler for programmers.
d. may fail unexpectedly due to stress.

21. Write declarations for two overloaded functions named bar(). They both return type int. The first takes one argument of type char, and the second takes two arguments of type char. If this is impossible, say why.

```
int bar(char);
int bar(char, char);
```

22. In general, an inline function executes faster than a normal function, but requires more memory.

23. Write the declarator for an inline function named foobar() that takes one argument of type float and returns type float.

```
inline float foobar(float fvar)
```

24. A default argument has a value that

a. may be supplied by the calling program.
b. may be supplied by the function.
c. must have a constant value.
d. must have a variable value.

25. Write a declaration for a function called blyth() that takes two arguments and returns type char. The first argument is type int, and the second is type float with a default value of 3.14159.

. `char blyth(int, float=3.14159);`

26. Scope and storage class are concerned with the visibility and lifetime of a variable.

27. What functions can access a global variable that appears in the same file with them?
. those functions defined following the variable definition

28. What functions can access a local variable?
. the function in which it is defined 29. A static local variable is used to
a. make a variable visible to several functions.
b. make a variable visible to only one function.
c. conserve memory when a function is not executing.
d. retain a value when a function is not executing.

30. In what unusual place can you use a function call when a function returns a value by reference?

on the left side of the equal sign

1. What is the purpose of a class definition?
A class declaration describes how objects of a class will look when they are created.
2. A class has the same relation to an object that a basic data type has to a variableof that type.

3. In a class definition, data or functions designated private are accessible
a. to any function in the program.
b. only if you know the password.
c. to member functions of that class.
d. only to public members of the class.

4. Write a class definition that creates a class called leverage with one private data member, crowbar, of type int and one public function whose declaration is void pry().

```
class leverage
{
private:
int crowbar;
public:
void pry();
};
```

5. True or false: Data items in a class must be private.
false; both data and functions can be private or public
6. Write a statement that defines an object called lever1 of the leverage class described inQuestion 4.

```
leverage lever1;
```

7. The dot operator (or class member access operator) connects the following two entities (reading from left to right):
a. A class member and a class object
b. A class object and a class
c. A class and a member of that class
d. A class object and a member of that class

8. Write a statement that executes the pry() function in the lever1 object, as described inQuestions 4 and 6.

```
lever1.pry();
```

9. Member functions defined inside a class definition are inline (also private) by default.

10. Write a member function called getcrow() for the leverage class described in Question4. This function should return the value of the crowbar data. Assume the function is defined within the class definition.

```
int getcrow()
{ return crowbar; }
```

11. A constructor is executed automatically when an object is .created (defined)

12. A constructor's name is the same as the class of which it is a member

13. Write a constructor that initializes to 0 the crowbar data, a member of the leverage class described in Question 4. Assume that the constructor is defined within the class definition.
leverage()
{ crowbar = 0; }

14. True or false: In a class you can have more than one constructor with the same name.

15. A member function can always access the data
a. in the object of which it is a member.
b. in the class of which it is a member.
c. in any object of the class of which it is a member.
d. in the public part of its class.

16. Assume that the member function getcrow() described in Question 10 is defined outside the class definition. Write the declaration that goes inside the class definition.
. int getcrow();

17. Write a revised version of the getcrow() member function from Question 10 that is defined outside the class definition.
int leverage::getcrow()
{ return crowbar; }

18. The only technical difference between structures and classes in C++ is that member functions and data are, by default, public in structures but private in classes

19. If three objects of a class are defined, how many copies of that class's data items are stored in memory? How many copies of its member functions?
. three, one
20. Sending a message to an object is the same as calling one of its member functions

21. Classes are useful because they
a. are removed from memory when not in use.
b. permit data to be hidden from other classes.
c. bring together all aspects of an entity in one place.
d. can closely model objects in the real world.

22. True or false: There is a simple but precise methodology for dividing a real-world programming problem into classes.
false; trial and error may be necessary
23. For the object for which it was called, a const member function
a. can modify both const and non-const member data.

b. can modify only const member data.
c. can modify only non-const member data.
d. can modify neither const nor non-const member data.

24. True or false: If you declare a const object, it can only be used with const member functions.

25. Write a declaration (not a definition) for a const void function called aFunc() that takes one const argument called jerry of type float

```
void aFunc(const float jerry) const;
```

1. An array element is accessed using
a. a first-in-first-out approach.
b. the dot operator.
c. a member name.
d. an index number.

2. All the elements in an array must be the *same* data type.

3. Write a statement that defines a one-dimensional array called doubleArray of type double that holds 100 elements.
double doubleArray[100];
4. The elements of a 10-element array are numbered from 0 to 9

5. Write a statement that takes element j of array doubleArray and writes it to cout with the insertion operator.
cout << doubleArray[j];

6. Element doubleArray[7] is which element of the array?
a. The sixth
b. The seventh
c. The eighth
d. Impossible to tell
Arrays and Strings

7. Write a statement that defines an array coins of type int and initializes it to the values of the penny, nickel, dime, quarter, half-dollar, and dollar.
int coins[] = { 1, 5, 10, 25, 50, 100 };
8. When a multidimensional array is accessed, each array index is
a. separated by commas.
b. surrounded by brackets and separated by commas.
c. separated by commas and surrounded by brackets.
d. surrounded by brackets.

9. Write an expression that accesses element 4 in subarray 2 in a two-dimensional array called twoD.
. twoD[2][4]
10. True or false: In C++ there can be an array of four dimensions.

11. For a two-dimensional array of type float, called flarr, write a statement that declares the array and initializes the first subarray to 52, 27, 83; the second to 94, 73, 49; and the third to 3, 6, 1.
float flarr[3][3] = { {52,27,83}, {94,73,49}, {3,6,1} };
12. An array name, used in the source file, represents the memory address of the array.

13. When an array name is passed to a function, the function
a. accesses exactly the same array as the calling program.
b. accesses a copy of the array passed by the program.

c. refers to the array using the same name as that used by the calling program.
d. refers to the array using a different name than that used by the calling program.

14. Tell what this statement defines:
employee emplist[1000];
an array with 1000 elements of structure or class employee

15. Write an expression that accesses a structure member called salary in a structure variable that is the 17th element in an array called emplist.
emplist[16].salary

16. In a stack, the data item placed on the stack first is
a. not given an index number.
b. given the index number 0.
c. the first data item to be removed.
d. the last data item to be removed.

17. Write a statement that defines an array called manybirds that holds 50 objects of type bird.
bird manybirds[50];

18. True or false: The compiler will complain if you try to access array element 14 in a 10-element array.

19. Write a statement that executes the member function cheep() in an object of class bird that is the 27th element in the array manybirds.
manybirds[26].cheep();
20. A string in C++ is an array of type char.

21. Write a statement that defines a string variable called city that can hold a string of up to 20 characters (this is slightly tricky).
char city[21] (An extra byte is needed for the null character.)

22. Write a statement that defines a string constant, called dextrose, that has the value “C6H12O6-H2O”.
char dextrose[] = “C6H12O6-H2O”;

23. True or false: The extraction operator (>>) stops reading a string when it encounters a space.

24. You can read input that consists of multiple lines of text using
a. the normal cout << combination.
b. the cin.get() function with one argument.
c. the cin.get() function with two arguments.
d. the cin.get() function with three arguments.

25. Write a statement that uses a string library function to copy the string name to the string blank.
. strcpy(blank, name);

26. Write the declaration for a class called dog that contains two data members: a string called breed and an int called age. (Don't include any member functions.)

```
class dog
{
private:
char breed[80];
int age;
};
```

27. True or false: You should prefer C-strings to the Standard C++ string class in new programs.

28. Objects of the string class
a. are zero-terminated.
b. can be copied with the assignment operator.
c. do not require memory management.
d. have no member functions.

29. Write a statement that finds where the string "cat" occurs in the string s1.
. int n = s1.find("cat");

30. Write a statement that inserts the string "cat" into string s1 at position 12.

s1.insert(12, "cat")