CS 162Quiz 1 Solution

1)The size declarator must meet the following requirements:When you are declaring an array, the size declarator must be an integer with value greater than zero. That is, you can not define an array with negative or zero size.

2)Subscript numbering in C++ always starts at\_\_\_\_\_\_\_\_\_\_.Numbering always starts with zero. This is due to the compiler computing the address of a location in the array as being its subscript added to the starting address of the array.

3)C++ hasno array \_\_\_\_\_\_\_\_\_ checking, which means you can inadvertently store data past the end of the array. C++ does not have bounds checking. You must do your own checking to make sure that subscripts or indices are within the bounds of the array (between 0 and size-1).

4)If a numeric array is partially initialized, the uninitialized elements will be set to \_\_\_\_\_\_.When you use an initializer list to initialize the elements of an array, any that are not explicitly set by the list are set to zero.int array[5] = {1,3,5}; array[0] == 1, array[1] == 3, array[2] == 5, array[3] == 0, array[4] ==

05)You cannotuse the \_\_\_\_\_\_\_\_ operator to copy data from one array to another in a single statement.You need to use a loop to copy elements from one array to another. You cannot do it in a single statement with an assignment (=)operator.

6)To pass an array to a function, you pass the array’s \_\_\_\_\_\_\_\_\_You pass the array’s name in the function call. For example:void display (int theArray[], int size);int main(){int values[6] = {1, 3, 5, 7, 9, 11};display(values, 6);}

7)It’s best to think of a two-dimensional array as having \_\_\_\_\_ and \_\_\_\_\_\_.When thinking of a two-dimensional array, you can think of it as having rows and columns. When you use a pair of nested loops to access the elements, the outer loop is for the rows and the inner loop is for the columns.

8)When initializing a two-dimensional array, it helps to enclose each row’s initialization list in:Each row is often separately included in curly braces {} so the compiler can differentiate between them.int values[3][4] = { {1, 3, 5, 7}, {2, 4, 6, 8}, {3, 6, 9, 12} };

9)To print out all the elements of a two-dimensional array, you would normally use:Nested loops as in this example:for(int i = 0; i < rows; i++}for(intj = 0; j < cols, j++}cout << theArray[i][j];

10)Given the following array definition:int values[5] = {4, 7, 6, 8, 2};What does the following statement display?cout << values[4] << “ “ << values[2] +values[3] << “ “ << ++values[1] << endl;The correct answer is:2 14 8.

CS161Quiz2Solution

1.The \_\_\_\_\_\_\_\_ search algorithm repeatedly divides the portion of an array being sorted in half.The binary search algorithm gets its name from the fact that it checks the middle value. Then, if that is not the correct value, it splits the array in half and repeats with either the larger or the smaller half.

2.The maximum number of comparisons performed by linear search to find an item in an array of N elements is:

The correct answer isN. On average, if the item is in the array, it will take N/2 comparisons.

3.A binary search will find the value it is looking for with just one comparison if that value is stored in the \_\_\_\_\_\_\_\_ array element.Since the binary search first checks the middle or centeritem, if that is the item beingsearched for, it will only take one comparson.

4.How many passes through the data does a selection sort of N data items make?As indicated above, each pass will place one item in order. The sort only needs to make N-1 iterations, since the final item willbe in the correct location after the last iteration.

5.If an array is sorted in \_\_\_\_\_\_\_\_\_ order, the values are stored from highest to lowest.Highest to lowest is descendingorder. Ascending order is when you have them from lowest to highest.

6.The maximum number of comparisons that a binary search function will make when searching for a value in a 2,000 element array is:Since you divide the array in ½ each time, it is the log of the next higher power of two. That is, it takes 1 step to do an array of size 1, 2 steps for an array of size three, 3 steps for an array of size seven, and so forth.The next power of 2 for 2,000 is 2048, which is 2^11. Thus the answer is 11.

7.How many numbers are placed in order on each pass through the data (each iteration of the inner loop) for the selection sort?

Each pass through the inner loop will place one itemin order.

8.The \_\_\_\_\_\_\_\_ search algorithm requires that the array’s contents be sorted.Since the binarysearch goes to either the half containing larger values or the half containing smaller values, the array must be sorted before using it.

9.The insertion sort would require fewer passes to sort a set of data that is already sorted?The insertion sort needs to go through each value and insert it into the proper location. Thus, it makes one complete pass through the data even if it is already sorted. It does not require moving anything in each pass though.

CS161Quiz3Solution

1.The\_\_\_\_\_\_\_\_operatorcanbeusedtodetermineavariablesaddress.Toaccesstheaddressinmemoryofavariable,insteadofitscontents,youusethereferenceoraddress operator, which isan ampersand&.This was first introduced in 161when it was used to passvaluesby referenceto functions.

2.The \_\_\_\_\_ operator can be used to work with the variable a pointer points to. (In other words, to get the value of the variable pointedtoby the pointer.)Pointers are variables or constantsthatcontaintheaddressofsomethingelse.Ifyou had the following code:intx= 6;int \* ptr = &x;Then x is an integer variable containing the value six and ptr is a pointer variable thatcontainstheaddressinmemorywherethevalueofx (six) is stored. To output theaddressofx,youwouldsimplydisplayptr:cout << ptr << endl;Ifyou wantedto output the contentsofx, which ptrpointsto, you would use the dereferenceorindirection operatorwhich isan asterisk\*.cout << \*ptr << endl;Althoughthisisthesamesymbolasmultiplication,youdonotdomultiplicationofpointers,sothereisnoopportunityforthecompilertobeconfused.

3.What does the indirection operator do?The correct answer is:a. It allows you to operate on the value stored at the addresspointedto by thepointer.(Asexplainedinquestion2above.)

4.Assumingthatptrisapointertoanint,whathappenswhenyouad 4toit?The correct answer is:e.Thepointerwillmove4integersforwardinmemory.Youarelimitedinwhatarithmeticyoucandoonapointer.Youcanstoreanaddress in it, you can addto it, or you can subtract to it. When you either addto it orsubtractfrom it,youarechangingitasifyouweremodifyingthesubscriptofanarray –thatis,adding4makesitpointtoanintegerfourlocationsforwardinmemoryorfourplacesfurtherinanarray.

5. What is the difference between a pointerto a constant and a constant pointer? (Chooseallthestatementsthatarecorrect!)A pointerto a constant is a pointerthat contains the value of a constant. So, the pointercan be changedto point to another location (which will also be treatedasa constant) but thelocation that it points to cannot be changed.constintSIZE = 6;constint\*cptr = & SIZE;You can not change thevalue that cptr points to, that is you can not do:\*cptr= 5;But you can changecptr itself:cptr++;On the other hand, a constant pointer is initializedto point to a given location in memory.Youcan change that location, but you cannot change what address itpointsto:int value = 6;int\* const CPTR = & value;It is legal to do this:\*CPTR = 5;but it is not legal to do this:CPTR++;Therefore answers b, c, e, andf are all true.

6. Choose the correctC++ code for defining a variable ptr thatis a constant pointer to an int.Asexplainedabove,theansweris:int\* const ptr;Tobetotallycorrect,thiswouldnotworksinceaconstantmustbedefinedwhenitisdeclared.A morecorrectstatementwouldbe:int\* const ptr = & value;

What is the purpose of the new operator?

Under what circumstances can you successfully return a pointer from a function?

Quiz 3

* Give one advantage and two disadvantages of using recursion
  + Recursion often provides a simpler algorithm
  + Recursion requires more memory than iteration
  + Recursion is less efficient than iteration
* What are the three things that are required of a recursive program?
  + A base case
  + Calling itself
  + When it calls itself, it must reduce the range of the function to approach the base case.
* Where are intermediate values stored when a recursive function is recursing?
  + system stack
* You can always rewrite an iterative algorithm (one with a loop) as a recursive algorithm.
  + True

Quiz 5

* What is the purpose of the new operator?
  + It is used to allocate memory for variables at runtime.
* Under what circumstances can you successfully return a pointer from a function?
  + When the variable pointed to is NOT local to the function.
* Creating a variable while a program is running is called:
  + [Dynamic memory](https://classes.lanecc.edu/mod/resource/view.php?id=2466732) allocation
* When a program is done with a chunk of dynamically allocated memory, it should free it with the DELET operator.
* When deleting memory that was allocated for an array, you should use the \_\_\_\_\_\_\_\_\_\_\_\_ operator.
  + Delete[]
* The members of a struct must be all of the same type.
  + False
* A struct can be used to return multiple values from a function using a single return statement.
  + True
* To dynamically allocate memory for an array named **numbers**that would hold **size**integers, you would code it as:
  + int \* numbers = new int[size];

Quiz 6

* Two common programming methods are in practice today. The older method is PROCEDURAL and the newer method is OBJECT-ORIENTED
* An object is a software entity that combines both data and PROCEDURES in a single unit.
* The default access specification of class members in C++ is
  + Private
* Creating a class object is often called the INSTANTIATION of a class.
* A class member function that uses or returns, but does not change, the value of a member variable is called a
  + Getter
* If you were writing the declaration of a class named Canine, what should you name the file it is stored in?
  + Canine.h
* A constructor is automatically called when an object is
  + Created
* A DEFAULT constructor is one that requires no arguments.
* A class may have more than one constructor, as long as each has a different
  + PARAMETER LIST

Quiz 7

* A structure variable is similar to a class object in which of the following way(s)?
  + Its data can be initialized with a constructor, It can be passed to a function or returned from a function
* When an object or structure variable is passed to a function as a constant reference:
  + the function accesses the original object, rather than a copy of it, the function cannot make any changes to the member variables, it is more efficient than passing it by value
* When a member function is defined outside of the class declaration, the function name must be qualified with the class name, followed by \_\_\_\_\_\_\_\_.
  + the scope resolution operator ::
* A class can have a member variable that is an instance of another class. This is called \_\_\_\_\_\_\_\_\_\_\_
  + object composition
* The \_\_\_\_\_\_\_\_ directive prevents a header file from being included in a program more than once.
  + #ifndef
* If employee is an instance of a class or structure with 3 member variables(name, salary, and department), the values of all three members will be output by the statement
  + cout << employee;
  + False
* When an object is passed \_\_\_\_\_\_\_\_ to a function, its members are not copied.
  + by reference, as a constant reference
* Choose a definition statement that defines a Car structure variable initialized with the following information:
  + Make: Ford  
    Model: Mustang  
    Year: 2004  
    Cost $25,000
  + Car hotRod(“Ford”, “Mustang”, 2004, 25000.0);
* The destructor is used to \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Delete any memory allocated with new
* If you create a pointer to an object, you access its member functions with the \_\_\_\_\_\_\_\_\_\_\_ operator
  + member access operator ->

Quiz 8

* A static method in a class can access any variable of that class.
  + False
* When a class contains memory allocated on the heap, you
  + need a deep copy
* A copy constructor is always required
  + False
* To overload the equality operator, you need to define a function with the name
  + operator==
* A friend method can not access private variables in the related class
  + False
* Which of the following method signatures is correct for a method that is being called from a const reference?
  + int getValue() const;

Quiz 7

* An abstract class is \_\_\_\_\_\_\_\_.
  + one that has at least one pure virtual function
* The term \_\_\_\_\_\_\_\_ means the ability to take many forms.
  + Polymorphism
* Polymorphism is when \_\_\_\_\_\_\_\_ in a class hierarchy perform differently, depending upon the class of the object making the call.
  + member functions
* A pure virtual function \_\_\_\_\_\_\_\_.
  + is a virtual function that has no implementation
* A virtual function is declared by placing the keyword \_\_\_\_\_\_\_\_ in front of the return type in the base class's function declaration.
  + Virtual
* In C++, polymorphism is very difficult to achieve unless you also use inheritance.
  + True