1. What is the role of a prototype program in problem solving?

It simulates the behavior of portions of the desired software product.

2. What stages in the software life cycle are influenced by the testing stage?

coding and refining

3. What are the main advantages associated with object-oriented programming?

Existing classes can be feused, Program maintenance and verification are easier

4. Where do C++ programs begin to execute?

main

5. What is a variable?

location in memory where a value can be stored

6. Where are variables declared in a C++ program?

Anywhere in the same scope before they are used

7. What is the main difference between a while and a do...while statement?

While loop evaluates its expression at the top of its loop and decides if it needs to execute, and the do-while always executes at least once and then evaluates its expression at the bottom of its loop.

8. What is typically included in a class definition?

data members and member functions

9. What is the difference between a data member and a local variable inside a member function?

The data member can be accessed outside of the class, whereas the local variable cannot.

10. What is the difference between a constructor and a function?

constructors cannot return values

11. When does C++ create a default constructor?

when no user-defined constructor exists

12. How many constructors can be created for a class?

As many as needed.

13. What is the difference between a function prototype and a function definition?

the Prototype creates a framework to call the function definition. While a function definition is where the function is actually programmed out and created into a final product.

14. What is the role of a header-file?

a header file is a file used to store a list of prototye functions and data members.

15. What does a function signature include?

The function signature includes the method name and the input types.

16. What is the scope of global variables?

They can be used throughout the program

17. How does the compiler handle inline functions?

The compiler can ignore the inline qualifier and typically does so for all but the smallest functions.

18. What is the main advantage associated with function arguments that are passed by reference?

It elimitates the need to copy large amonts of data

19. How are overloaded functions differentiated by the compiler?

It selects the proper function to execute based on number, types and order of arguments in the function call.

20. When defining a recursive function, what are possible causes for infinite recursion?

Either omitting the base case or writing the recursion step incorrectly so that it does not converge on the base case can cause an infinite recursion.

21. What are the similarities between iteration and recursion?

Both iteration and recursion are based on control statements and involve repetition. They can both also occur indefinitely.

22. What are the two different ways of specifying the length of an array?

int n[10]; //array of 10 integers and int n[arraySize] //where arraySize is some positive integer defined by the user

23. What are the two different ways of specifying the length of an array?

use an arraylist, or have your program ask the array how many elements it has. As an obj it it should have member length that is the number of slots it has.

24. What is the main difference between strings declared using the type string versus strings declared using an array of characters?

the type string is a class and is safer, while the other is just an array of characters.

25. How are arrays passed to functions?

by reference

26. What is the difference between an array declared as static, and one that is not?

A static array cannot be changed in the program.

27. How many dimensions need to be specified when passing a multi-dimensional array as an argument to a function?

one

28. In one sentence, what is the main idea implemented by insertion sort?

Starting with the first element in the array, each following element is put in place by determining if it is smaller or larger than the starting element.

29. In one sentence, what is the main idea implemented by selection sort?

the sort finds the largest item and places it at the end, then then next largest is found and placed next to last, continue until there is only one number left, this is the beginning of the sorted array

30. What is the number of operations for insertion sort under a best-case scenario, and what is the best-case scenario?

the best case is if it only has to look through the list once. The best case scenario is when it goes through the list and doesn't have to make any changes (the list is already sorted)

31. What is the base case for a recursive implementation of merge sort?

O(n log n)

32. What does the address (&) operator return?

Returns memory address of its operand.

33. What does the star (*) operator return?

the * operator returns the value in the memory address the element points to.

34. How can an array be addressed in pointer/offset notation?

Element b[n] can be accessed by *(bPtr + n) is an example of how an array can be addressed as pointer/offset notation.

35. What does the sizeof operator return?

the size of the string.

36. What are the different ways to pass a pointer to a function?

Non-constant pointer to non-constant data, non-constant pointer to constant data, constant pointer to constant data, constant pointer to non-constant data.

37. What is a function pointer?

pointers that contain the addresses of functions.

38. What is a linked list?

A link list is a data structure which is built from structures and pointers. It forms a chain of nodes with pointers representing the links of the chain and holding the entire thing together

39. What is the main advantage of linked lists over arrays?

linked lists are abe to grow as needed to a new size

40. How are linked lists passed as arguments to a function?

They are passed by reference because you want the function to change the pointer

41. What is the difference between a circular linked list and a basic linked list?

In a circular linked list, the last node points to the first node.

42. What is the main advantage of a doubly-linked list over a basic linked list?

You can traverse the list in reverse.

43. What is the main disadvantage of a doubly-linked list over a basic linked list?

More difficult to delete and create nodes.

44. What is a stack?

Stores a set of elements in a last in first out order.

45. What are the two main functions defined by a stack?

push (to add to a item the Stack) Pop (to pull the last item added from an array.)

46. How can you implement a stack with an array?

with the element added to the array, so that the last element added is at the end, and when the element is popped it takes the last element off the array

47. How can you implement a stack with a list?

Elements are only inserted and removed from the head of the list. There is no header node or current pointer.

48. How are infix expressions evaluated by computers?

computers convert infix expressions to postfix form before evaluation

49. What operations would you need to perform to find a given element on a stack?

to pop elements then push them back

50. What is a queue?

a queue is a list of things that follows the first in first out behavior

51. What are the two main functions defined by a queue?

rear and front

52. How can you implement a queue with a list?

theoretically you could do it two ways one of which uses more processing power and memory no larger than the queue is ever at when full and the other which uses almost infinite memory. The more practical method would be two place the items in an array and remove the item in position one of the array after which you can shift the array and add another element if required. The other option which can use infinite memory when used for long term queues such as job scheduling that goes nonstop for extended periods. that is to implement an array and add the items read item one raise your counter value to two ecetera and continue adding more elements to the array. the downside to this method is after you use element one it is still in memory. or im crazy who knows

53. What is the stack operation corresponding to the enqueue operation in queues?

Push in a stack operation corresponds to the enqueue operation in queues. These operations insert a new item into one end(the top and back, respectively) of the ADT.

54. What is a tree?

a tree is a series of nodes where each node has links to other nodes.

55. What is the height of a tree?

the distance from the deepest leaf to the root

56. What is a leaf?

A leaf is a node with no children

57. What is a binary tree?

A tree where every node has no more than two children

58. What is the inorder traversal of a binary tree?

The inorder traversal of a binary tree visits the node of a binary tree in order according to their data values.

59. How many comparisons does it take to find an element in a binary search tree?

Depends on what half of the tree and the levels you have.

60. What are the elements typically included in a class definition?

The variables and function prototypes.

61. What are the access-specifiers that can be used in a C++ class definition?

The access-specifiers that can be used in a C++ class definition is private and public.

62. How are objects initialized when they are created?

Constructors; default when not provided by user, or programmer specified constructors.

63. What is a function signature?

Contains the function name and its paramaters. The return type is not included

64. What is a recursive function?

a function that calls itself until a base case is met

65. What is the alternative way to solve a problem that could be solved through recursive functions?

Iteration. A while loop or a for loop will be able to accomplish the same desired outcome... It may be faster than recursion, but could also be harder to understand.

66. What is the difference between an array that is declared as static and one that is not?

a static array will be called only once. once it has been declared the complier will ignore the static line if it comes to it again.

67. What is the main difference between a string of characters that is read into a variable of type string versus a variable of type char[]?

String contains a word where as char can contain phrases or a string of characters.

68. Briefly describe the divide-and-conquer paradigm.

Divide elements,recur then conquer, which works in merge sort and quicksort.

69. Briefly describe in one sentence how does merge sort work?

It divides the array into two halves, sorts each half, then merges the two halves together.

70. What is a pointer?

A pointer is a variable that contains the memory address of a given value.

71. What is the experimental approach for measuring the running time of an algorithm?

time complexity using big O logarthmic O(log n) linear O(n) exponential O(n^2) quadratic O(n^k) k>=1 Polynomial O(a^n) n>1

72. Briefly, how does selection sort work?

Selection sort is a sorting algorithm that divides a list in half and has two lists. It then compares the first elements in both these lists and puts these elements in another list, having the smaller element before the bigger one.

73. What is the advantage of linked lists over arrays?

Linked lists do not have a definite size. They can be as big or as small as needed, and they don't have to allocate extra memory for elements you don't need. Arrays size must be defined.

74. What is a queue?

a data structure that inserts elements at the end of it and removes elements from the front.

75. What are the main operations associated with a stack?

Push and pop.

76. What is the Euler tour traversal of a tree?

Traversing a tree down to it's terminal child and then all of it's siblings, then it traverses up the terminal child's parent and all of it's siblings (repeating the first step if those siblings have children) until the root node has been visited.

77. How do you delete a node from a binary search tree?

The way you delete a node from a binary search tree is first you have take the root and then see the nodes that are coming from the root. And delete the nodes and set the root to NULL.

78. How many steps does it take to search a node in a binary search tree?

It would take n/2 elements, given n.