Republic of Republic of the Philippines
SULTAN KUDARAT STATE UNIVERSITY
College of Computer Studies
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Data Structure and Algorithm
Midterm Examination
1st Semester
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Name: _____ Year /Section: _____ Score: _____

General Instructions:

1. Write all your answers in the space provided.
2. Write neatly and legibly.
3. Erasure or change of answer in any way is strictly not allowed

Test i: Multiple Choice

_____1. Which of the following is a characteristic of a primitive data structure?
a) It is built from other data structures.
b) It is directly operated upon by machine instructions.
c) It is used to store complex relationships between data.
d) It requires traversal for data access.

_____2. What is the term for the values passed to a function when it is called?
a) Formal parameters b) Function prototypes
c) Actual parameters (arguments) d) Return types

_____3. Which part of a function definition contains the instructions that the function executes?
a) Return type b) Function name
c) Parameter list d) Function body

_____4. What symbol is used to declare a pointer variable in C++?

a) & b) * c) -> d) .

_____ 5. What operator is used to access the value stored at a memory address pointed to by a pointer?
a) & b) -> c) * d) .

_____6. What keyword is used to define a structure in C++?
a) class b) struct c) union d) object

_____7. In a singly linked list, what does the last node's pointer point to?
a) The first node b) The previous node
c) nullptr d) A random memory location

_____8. What is the primary advantage of a linked list over an array?
a) Faster random-access b) Dynamic resizing
c) Contiguous memory allocation d) Simpler implementation

_____9. What is the fundamental building block of a linked list?

a) Array b) Node c) Variable d) Function

_____10. Explain the difference between primitive and non-primitive data structures.

a) Primitive are complex, non-primitive are simple.
b) Primitive are built-in, non-primitive are derived from primitive.
c) Primitive are dynamic, non-primitive are static.
d) Primitive are for searching, non-primitive are for sorting.

_____11. What is the purpose of an Abstract Data Type (ADT)?

a) To provide implementation details of a data structure.
b) To define only the interface of a data structure.
c) To directly manipulate hardware memory.
d) To replace primitive data types.

_____12. Explain the difference between formal and actual parameters.

a) Formal parameters are used when calling the function, while actual parameters are used in the function definition.
b) Formal parameters are placeholders in the function definition, while actual parameters are the values passed during the function call.
c) Formal parameters are return types, while actual parameters are function names.
d) There is no difference between formal and actual parameters

_____13. What is the significance of the "return" keyword in a function?

a) It defines the function name.
b) It specifies the function's parameters.
c) It ends the function's execution and optionally returns a value.
d) It declares the function's return type.

_____14. Describe a scenario where a function might be created without any parameters.

a) When the function needs to perform calculations based on external user input.
b) When the function performs a task that doesn't require any input, such as printing a fixed message.
c) When the function must return a specific value.
d) All functions must have at least one parameter

_____15 What is the primary purpose of using pointers in C++?

a) To store data directly.
b) To store memory addresses and manipulate data indirectly.
c) To perform arithmetic operations.
d) To define data types.

_____16. How does using pointers enable the modification of variables within a function that affects the calling code?

a) By creating a local copy of the variable.
b) By directly accessing and modifying the original variable's memory address.
c) By returning a new variable.
d) By using global variables.

_____17. Explain the difference between passing a variable by value and passing a variable by reference using pointers.

a) Pass-by-value modifies the original variable, while pass-by-reference creates a copy.
b) Pass-by-reference modifies the original variable, while pass-by-value creates a copy.
c) Pass-by-value and pass-by-reference both modify the original variable.
d) Pass-by-value and pass-by-reference both create a copy.

_____18. What is the purpose of defining a structure?

a) To perform mathematical operations.
b) To group related data items into a single unit.
c) To create dynamic memory allocation.
d) To define functions.

_____19. A structure allows you to group data items of:

a) The same data type only. b) Different data types.
c) Only primitive data types. d) Only user defined data types.

_____20. What is the purpose of defining a structure?

a) To perform mathematical operations.
b) To group related data items into a single unit.
c) To create dynamic memory allocation.
d) To define functions.

_____21. When a structure instance is created without initialization, what happens to its members?

a) They are assigned random values.
b) They contain default values.
c) The program throws an error.
d) They remain unallocated.

_____22 If you have a structure named Point with members x and y, how would you access the x member of a Point instance named p1?

a) p1->x b) p1::x c) p1.x d) x.p1

_____23. If you need to store a collection of integers where you frequently need to add and remove elements from the end, which data structure would be most suitable?

a) Array b) Linked list c) Stack d) Tree

__24. You have a program that needs to search through a large inventory of items. Which aspect of data structures is most relevant to improving the speed of this search?

a) Reusability b) Abstraction
c) Data organization d) Machine-level instructions

_____25. You need to create a function that takes an integer as input and prints whether it is even or odd. Which function signature would be most appropriate?

a) int checkEvenOdd(int num); b) void checkEvenOdd(int num);
c) int checkEvenOdd(); d) void checkEvenOdd();

_____26. Develop a void function that prints "Hello, World!" to the console.

a) int printHello(); b) void printHello(string message);
c) void printHello(); d) string printHello();

_____27. Write a function call that passes the values 5 and 10 to a function named "calculateSum" that takes two integer parameters.

a) calculateSum(); b) calculateSum(5);
c) calculateSum(5, 10); d) calculateSum(10, 5);

_____28. Write the code to declare an integer pointer named "ptr" and initialize it with the address of an integer variable named "num".

a) int ptr = num; b) int *ptr = #
c) int &ptr = num; d) int ptr = #

_____29 Given the code int num = 5; int *ptr = # *ptr = 10;, what is the value of num after these statements are executed?

a) 5 b) 10
c) The memory address of num d) An error

_____30 Develop a function that swaps the value of two float variables that are passed into the function by reference using pointers.

a) void swap(float a, float b); b) void swap(float *a, float *b);
c) float swap(float a, float b); d) float swap(float *a, float *b);

_____31. You have a structure Employee { int id; float salary; };. Write the code to assign a salary of 50000.0 to an Employee instance named emp.

a) emp->salary = 50000.0; b) emp.salary = 50000.0;
c) salary.emp = 50000.0; d) Employee.salary(50000.0);

_____32. What would be the output of the following code?

```
struct Data { int value; };
int main()
{
Data d;
d.value = 20;
 d.value += 10;
 std::cout << d.value;
  return 0;

        }
```

a) 5 b) 10 c) 20 d)30

_____33. You need to implement a queue. Which linked list type would be most suitable?

a) Singly linked list b) Circular linked list
c) Doubly linked list d) Any linked list type

_____34. You have a doubly linked list. How would you delete a node given its pointer?

a) Update the previous and next pointers of adjacent nodes to bypass the node.
b) Set the node's data to null.
c) Move the node to the end of the list.
d) Set the node's pointer to itself.

_____35. How would you traverse a singly linked list to print the data of each node?

a) Start at the head, follow the "next" pointers, and stop when you reach nullptr.
b) Start at the end, follow the "previous" pointers, and stop at the head.
c) Access each node using an index.
d) Use a recursive function to access all nodes.

_____36) : Analyze the impact of choosing an inappropriate data structure on program performance.

a) It has no impact.
b) It can lead to inefficient memory usage and slow execution.
c) It only affects code readability.
d) It improves program security.

_____37) Evaluate the trade-offs between using primitive versus non-primitive data structures.

a) Primitive are always better due to simplicity.
b) Non-primitive offer more flexibility but may have higher overhead.
c) Primitive are only for small datasets.
d) Non-primitive are only for mathematical operations.

_____38) Analyze the impact of using functions with no return values (void functions) on program flow.

a) They always return a default value.
b) They terminate the program immediately.
c) They perform actions without returning a result, and program flow continues after their execution.
d) They can only be used in specific programming languages.

_____39) Compare and contrast the use of function prototypes with the actual function definitions in C++.

a) Prototypes define the function's body, while definitions declare the function's existence.
b) Prototypes declare the function's existence and signature, while definitions contain the function's implementation.
c) Prototypes and definitions are identical in C++.
d) Prototypes are used for void functions, while definitions are used for functions with return values.

_____40) Evaluate the benefits of using functions with parameters versus functions without parameters in different programming scenarios.

a) Functions with parameters are always more efficient.
b) Functions without parameters are only useful for printing messages.
c) Functions with parameters allow for more dynamic and flexible code, while functions without parameters are suitable for static, repetitive tasks.
d) There is no difference in their benefits.

_____41) Compare and contrast the use of pointers with the use of references in C++.

a) Pointers and references are identical in functionality.
b) Pointers can be reassigned, while references cannot; pointers require dereferencing, while references do not.
c) References can be reassigned, while pointers cannot.
d) Pointers are safer than references.

_____42) Evaluate the benefits of using pass-by-reference with pointers in terms of memory usage and performance.

a) Pass-by-reference always consumes more memory.
b) Pass-by-reference can improve performance by avoiding copying large data structures, but requires careful memory management.
c) Pass-by-reference has no impact on memory or performance.
d) Pass-by-reference is only useful for simple variables.

_____43) How does the concept of pointer arithmetic affect the manipulation of arrays in C++?

a) Pointer arithmetic has no effect on arrays.
b) Pointer arithmetic allows you to navigate and access array elements efficiently by incrementing or decrementing pointer addresses.
c) Pointer arithmetic can only be used with single variables.
d) Pointer arithmetic is only used to calculate the size of arrays.

_____44) Compare and contrast the memory usage of a linked list versus an array for storing the same number of elements.

a) Linked lists use less memory due to dynamic allocation.
b) Arrays use less memory due to contiguous allocation.
c) Linked lists use more memory due to storing pointers.
d) Memory usage is the same for both.

_____45) In what scenarios would a circular linked list be more efficient than a linear linked list?

a) When random access is required.
b) When implementing a queue that loops back to the beginning.
c) When memory allocation is fixed.
d) When performing binary search

_____ 46) How does using structures improve code organization compared to using individual variables?

a) It reduces memory usage.
b) It groups related data, making code more readable and maintainable.
c) It allows for faster execution.
d) It automatically sorts data.

_____47) In what scenarios would using a structure be more advantageous than using an array?

a) When storing a collection of elements of the same data type.
b) When storing a collection of elements of different data types.
c) When performing mathematical operations on a large set of numbers.
d) When dynamically allocating memory for a single variable.

_____48: Consider a structure with nested structures. What are the implications for memory layout and access?

a) Nested structures increase memory fragmentation.
b) Nested structures allow complex data relationships and require multiple dot operators for access.
c) Nested structures reduce memory usage by sharing memory locations.
d) Nested structures only allow access through pointers.

_____49. Why is insertion and deletion efficient in a linked list compared to an array?

a) Because linked lists use contiguous memory.
b) Because linked lists do not require shifting elements.
c) Because arrays cannot be resized.
d) Because arrays are always sorted.

_____50. How does the use of Abstract Data Types (ADTs) contribute to software maintainability?

a) By directly exposing implementation details.
b) By separating interface from implementation, allowing changes without affecting client code.
c) By reducing code complexity.
d) By eliminating the need for comments.

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