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WGU Foundations-of-Computer-Science Exam Syllabus Topics:

Section	Objectives
Algorithm Efficiency	- Choose an appropriate sorting algorithm method based on a given scenario - Choose an appropriate algorithm searching method based on a given scenario - Describe the relationships between algorithm complexity and data structures
Basic Program Design	- Use functions, methods, and packages to leverage programming language - Identify variables and data types within a programming language - Explain how to store, access, and manipulate data in lists
Data Profiling	- Apply fundamental concepts and subsetting techniques to a dataset - Utilize a programming language to manipulate arrays and discover insights
OS Fundamentals	- Identify common privacy and security concepts that could be implemented in operating systems - Describe fundamental principles and core concepts of operating systems - Demonstrate various techniques and tools to manage operating systems

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exam easily.

WGU Foundations of Computer Science Sample Questions (Q41-Q46):

NEW QUESTION # 41

What is the main advantage of using NumPy arrays over regular Python lists for data analysis?

- A. NumPy arrays can bring different types into the array at the same time.
- B. NumPy arrays can concatenate lists by default.
- **C. NumPy arrays can perform calculations over entire collections of values.**
- D. NumPy arrays can only hold elements of the same type.

Answer: C

Explanation:

The primary advantage of NumPy arrays in data analysis is their support for fast, vectorized computation over whole collections of numeric data. A NumPy `ndarray` stores elements in a contiguous memory block with a single, fixed data type, enabling efficient low-level operations implemented in optimized C/Fortran code. As a result, expressions like `arr + 5`, `arr * arr`, or `np.mean(arr)` operate over the entire array without explicit Python loops. This style is commonly called **vectorization**, and it is a central theme in scientific computing textbooks because it is both clearer to read and significantly faster for large datasets.

Option A describes a property of Python lists, not NumPy arrays. Python lists can mix types freely, but this flexibility comes with overhead. Option B is true-NumPy arrays typically hold a single dtype-but it is not the main advantage; it is more of an implementation feature that enables speed and memory efficiency.

Option D is not a defining advantage; both lists and arrays can be concatenated, and NumPy provides dedicated functions such as `np.concatenate`, but concatenation is not the core reason NumPy dominates data analysis workflows.

Because NumPy operations are applied element-wise across entire arrays and can leverage CPU vector instructions and efficient memory access patterns, they form the foundation for higher-level tools like pandas, SciPy, and many machine learning libraries. This is why the best answer is that NumPy arrays can perform calculations over entire collections of values.

NEW QUESTION # 42

Which sorting algorithm works by finding the smallest or largest element in an unsorted part of a list and moving it to the sorted part of the list?

- A. Radix sort
- B. Quicksort
- **C. Selection sort**
- D. Heap sort

Answer: C

Explanation:

Selection sort is defined by a simple repeated strategy: divide the list into a sorted region and an unsorted region, then repeatedly select the smallest (or largest) element from the unsorted region and move it to the end of the sorted region. In the common "smallest-first" version, the algorithm scans the unsorted portion to find the minimum element, then swaps it into the next position in the sorted portion. After the first pass, the smallest element is fixed at index 0; after the second pass, the second-smallest is fixed at index 1; and so on until the entire list is sorted.

This exactly matches the description in the question, making selection sort the correct answer. Textbooks often use selection sort to teach algorithmic thinking because it is easy to understand and implement, though not efficient for large datasets. Its time complexity is $O(n^2)$ in the average and worst case because it performs roughly n scans of progressively smaller unsorted sections, with each scan taking linear time. Its space usage is $O(1)$ additional space because it sorts in place using swaps.

The other options do not match the described mechanism. Quicksort partitions around a pivot, heap sort uses a heap data structure to repeatedly extract the maximum/minimum, and radix sort processes digits/keys by place value rather than selecting minima by scanning. Selection sort's defining action is the repeated "select the min/max and place it."

NEW QUESTION # 43

```
print(20 # 5)
```

What will the output be of this line?

- A. #25

- B. no output
- C. 20 + 5
- D. Syntax Error

Answer: B

Explanation:

In Python, the # character begins a comment. Everything from # to the end of the line is ignored by the interpreter and is not executed. Therefore, the line # print(20 # 5) produces no output because it is a comment, not an executable statement. This is a standard concept in programming language textbooks: comments are for humans, not for the machine, and they are used to document code, explain intent, temporarily disable statements during debugging, or leave notes about assumptions and design choices.

Even though the line contains an unusual symbol #, it does not matter here, because the interpreter never tries to parse the commented text. If the # were removed, then Python would attempt to parse print(20 # 5), and since # is not a valid Python operator, that would indeed trigger a syntax error. But with the leading #, the entire line is inert.

Option A is incorrect because nothing is evaluated. Option C is incorrect because comments are not printed; they remain only in the source code. Option D is incorrect for the commented version of the line, since Python does not check comment contents for syntax. Thus, the correct result is no output.

NEW QUESTION # 44

What is the built-in data structure that implements a hash table in Python?

- A. Tuple
- B. Dictionary
- C. List
- D. Array

Answer: B

Explanation:

A hash table is a data structure that supports fast lookup, insertion, and deletion by using a hash function to map keys to positions in an underlying storage structure. In Python, the built-in data structure that provides hash-table behavior is the dictionary, written with curly braces like {"a": 1, "b": 2}. Dictionaries store key-value pairs and are designed so that accessing a value by key, such as d["a"], is efficient on average.

Textbooks typically describe this expected efficiency as average-case constant time, often written as $O(1)$, assuming a good hash function and a well-managed table size.

Tuples and lists are sequence types. Lists provide indexed access by integer position, not hashing by arbitrary keys. Tuples are immutable sequences and likewise do not provide key-based hashing semantics. "Array" is not the core built-in mapping structure in Python; while Python has an array module and NumPy has arrays, neither is the built-in hash table abstraction for general key-value storage.

Python dictionaries require keys to be hashable, meaning the key's hash value is stable during its lifetime (common examples: strings, numbers, tuples of hashable items). This requirement is directly tied to hash-table implementation. Dictionaries are used throughout computer science applications:

symbol tables in interpreters, caches and memoization, frequency counting, indexing, and implementing graphs via adjacency maps.

NEW QUESTION # 45

Which process is designed to establish the identity of the user such as with a username and password?

- A. Registration
- B. Certification
- C. Authentication
- D. Verification

Answer: C

Explanation:

Authentication is the security process of proving or establishing a user's identity. In textbook terminology, authentication answers the question: "Who are you?" Common authentication factors include something you know (password, PIN), something you have (smart card, hardware token), and something you are (biometrics). Username and password is the classic "something you know"

mechanism, where the username identifies the account and the password serves as a secret used to validate that the user is the rightful owner of that account.

Authentication is distinct from authorization, which determines what an authenticated user is allowed to do (permissions, roles). It is also distinct from registration, which is the administrative act of creating an account or enrolling a user in a system. "Verification" is a general term that can appear in many contexts, but in security frameworks the precise term for identity establishment is authentication. "Certification" usually refers to issuing or validating credentials such as digital certificates (PKI) or professional certifications, not the act of logging in with a password.

Textbooks emphasize that authentication should be strengthened with practices like hashing and salting passwords, multi-factor authentication (MFA), lockout policies, and secure transport (e.g., TLS) to prevent credential theft. The core concept remains: the process that establishes identity using credentials like a username and password is authentication.

NEW QUESTION # 46

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