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2.2.

(A B (C) - needs one parenthesis at the end.

((A) (B)) - CORRECT

A B)(C D) - needs one parenthesis at the end and two at the beginning.

(A (B (C)) - needs one parenthesis at the end.

(A (B (C))) - CORRECT

(((A) (B)) (C)) - CORRECT

2.4

Answer: ((BOWS ARROWS) (FLOWERS CHOCOLATES))

2.6

() NIL

(()) (NIL)

((())) ((NIL))

(() ()) (NIL NIL)

(() ((())) (NIL (NIL))

2.13

CAAAR	FUN
CADADR	THE
CAADR	IN
CAADDR	SUN

2.15. Using the list ((A B) (C D) (E F)), fill in the missing parts of

this table.

Function Result

CAR	(A B)
CDDR	((E F))

CADR	(C D)
CDAR	(B)
CADAR	B
CDDAR	NIL
CAAAR	A
CDADDR	(F)
CADADDR	F

2.16. What does CAAR do when given the input (FRED NIL)?

- result in an error because you cannot take the CAR of a non-list element (‘FRED')

Sebesta Chapter 1 review questions

6. In what language is most of UNIX written?

- In C

7. What is the disadvantage of having too many features in a language?

- A language with too many features can be detrimental to readability. A large number of constructs can make the language more difficult to learn and understand. Programmers may not be familiar with all of them, leading to misuse of some and disuse of others.

8. How can user-defined operator overloading harm the readability of a program?

- user-defined operator overloading can harm readability by making it difficult to understand the meaning of an expression. When a programmer defines a new meaning for an operator, it can be confusing for other programmers (or even the original programmer later on) to figure out what the operator is actually doing.

9. What is one example of a lack of orthogonality in the design of C?

- C has two structured data types: arrays and structs (records). However, there's a lack of orthogonality in how these types are handled when it comes to returning them from functions. While you can return a struct from a function, you cannot return an array. This inconsistency breaks the principle of orthogonality, where a small set of constructs should be combinable consistently.

10. What language used orthogonality as a primary design criterion?

- ALGOL 68

11. What primitive control statement is used to build more complicated control statements in languages that lack them?

- the **goto** statement

12. What does it mean for a program to be reliable?

- A reliable program is one that consistently performs as expected, under all conditions.

13. Why is type checking the parameters of a subprogram important?

- Type checking parameters ensure that the data being passed to a subprogram is of the correct type. This helps prevent errors that can occur when a subprogram tries to use data in a way that it wasn't designed for.

14. What is aliasing?

- Aliasing occurs when two or more different names refer to the same memory location.

15. What is exception handling?

- Exception handling is a mechanism that allows programs to gracefully deal with unexpected events or errors that occur during execution.

16. Why is readability important to writability?

- Readability is important to writability because clear, understandable code reduces cognitive load, helps you reason through logic more effectively, and makes it easier to debug, extend, and collaborate. When code is readable, you can write and build on it faster and with fewer mistakes.

20. What two programming language deficiencies were discovered as a result of the research in software development in the 1970s?

- Incompleteness of type checking
- Inadequacy of control statements

21. What are the three fundamental features of an object-oriented programming language?

- Encapsulation
- Inheritance
- Polymorphism

22. What language was the first to support the three fundamental features of object-oriented programming?

- Simula 67 introduced OOP concepts, but Smalltalk was the first to fully implement all OOP features

23. What is an example of two language design criteria that are in direct conflict with each other?

- The book gives the example of reliability and cost of execution. For instance, Java requires runtime checks for array bounds, which makes programs more reliable but also slows down execution.
- Another language design criteria that are directly in conflict based on the lecture are Orthogonality and Simplicity.

24. What are the three general methods of implementing a programming Language

- Compilation
- Pure interpretation
- Hybrid implementation

25. Which produces faster program execution, a compiler or a pure interpreter?

- A **compiler** produces faster program execution compared to a **pure interpreter** because it translates the entire program into machine code before execution, allowing the program to run directly on the hardware. In contrast, a pure interpreter translates and executes code line by line, introducing additional overhead during runtime.

29. What are the advantages in implementing a language with a pure interpreter?

- A pure interpreter provides several advantages, including immediate feedback during execution, faster start-up since there's no compilation step, and easier debugging as errors are identified line by line. It ensures platform independence by running code directly on any system with the interpreter. Additionally, it supports dynamic features like runtime code modification and is simpler to implement, making it ideal for interactive development, rapid prototyping, and educational environments.