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Homework 1 Q1 and Q2

Lisp Text Questions

1. **(2.2):** The properly balanced among the provided options are: **Option B: ((A) (B))**

   Option E: (A (B (C))) &

   Option F: (((A) (B)) (C))

   (2.4): The parenthesis notation for the list is:

   ((BOWS ARROWS) (FLOWERS CHOCOLATES))

   (2.6): Matched Pairs: **( ) → NIL**

   (( )) → (NIL)

   ((())) → ((NIL))

   (( ) ( )) → (NIL NIL)

   (( ) (( ))) → (NIL (NIL))

   (2.13): FUN:

```
Step      Result
start     (((FUN)) (IN THE) (SUN))
C..AR     ((FUN))
C.AAR      (FUN)
CAAAR       FUN
```

   IN:

```
Step      Result
start     (((FUN)) (IN THE) (SUN))
C...DR     ((IN THE) (SUN))
C..ADR      (IN THE)
CAADR       IN
```

   THE:

```
Step      Result
start     (((FUN)) (IN THE) (SUN))
C...DR     ((IN THE) (SUN))
C..ADR      (IN THE)
C.DADR      (THE)
CADADR       THE
```

SUN:

Step	Result
start	`(((FUN)) (IN THE) (SUN))`
C...DR	`((IN THE) (SUN))`
C..DDR	`(SUN)`
CADDR	`SUN`

(2.15):

CDDR	`((E F))`
CADR	`(C D)`
CDAR	`(B)`
CADAR	`B`
CDDAR	`()/NIL`
CAAR	`A`
CDADDR	`(F)`
CADADDR	`F`

(2.16): Assuming FRED is not a list CAAR would output **an Error Message,** however, if FRED was a list of characters CAAR would give **F.**

Sebesta Questions

6. In C.

7. Having an abundance of features can complicate the language, making it harder to learn. It can also lead to misuse of features and inconsistent coding styles.

8. If operator overloading isn't done in a consistent manner, it can confuse readers about how operators behave, making the program more difficult to understand.

9. In C, structs can be returned from functions, but arrays cannot. This inconsistency can be one example of a lack of orthogonality in the language's design.

10. ALGOL 68 was designed with orthogonality as a primary criterion, aiming for a consistent and predictable language structure.

11. The GOTO statement is used as a basic control structure to build more complex control flows in languages that lack more advanced constructs.

12. A program is considered reliable if it consistently performs according to its specifications under all conditions, including handling unexpected inputs and errors effectively.

13. Type checking ensures that parameters passed to subprograms match expected types, preventing runtime errors and enhancing the overall reliability of the program.

14. Aliasing occurs when multiple names or references are used to access the same memory location, potentially causing unintended side effects.

15. Exception handling is a programming mechanism that enables programs to detect, manage, and recover from unexpected errors or unusual conditions during execution, thus preventing crashes.

16. Readability directly influences writability because clear, understandable code facilitates easier modification and extension, reducing the likelihood of introducing errors.

20. Incompleteness of type checking and inadequacy of control statements.

21. Object-oriented programming includes encapsulation (combining data and methods into objects), inheritance (creating new classes based on existing ones), and dynamic method binding (polymorphism).

22. Smalltalk was the first language to fully support these features.

23. Readability and writability: Adding features for writability (like operator overloading) can compromise readability, making the language harder to understand.

24. Programming languages can be implemented through compilation, pure interpretation, or hybrid methods.

25. A compiler produces faster program execution because it translates code into machine language beforehand, eliminating the need for runtime translation.

29. Benefits include improved error diagnosis during execution, platform independence, support for dynamic code execution, and immediate execution without compilation, which aids in quick code testing during development.

Thank you!!