Questions 1 and 2
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From LISP text
2.2) Which of these are well-formed lists? That is, which ones have
      properly balanced parentheses?
(A B (C)
((A) (B))
A B)(C D)
(A (B (C))
(A (B (C)))
(((A) (B)) (C))

Answer-

(A B (C)- Not well-formed. Missing a closing parenthesis)
((A) (B))- **Well-formed**. Parentheses are balanced.
A B)(C D)- Not well-formed. Contains a closing parenthesis) before any opening parenthesis (.
(A (B (C))- Not well-formed. Missing a closing parenthesis).
(A (B (C)))- **Well-formed**. Parentheses are balanced.
(((A) (B)) (C))- **Well-formed**. Parentheses are balanced.

2.4) What is the parenthesis notation for this cons cell structure?
Answer-
 ((BOWS ARROWS) (FLOWERS CHOCOLATES)).

2.6) Match each list on the left with a corresponding list on the right by substituting NIL for ( )
wherever possible. Pay careful attention to levels of parenthesization.
Answer-

   i)   ( ) -------NIL
   ii)   (( )) --------- (NIL)
   iii)   ((( )))--------((NIL))
   iv)   (() ()) --------- (NIL NIL)
   v)   (() (()))----------(NIL (NIL))

2.13) Write down tables similar to the one above to illustrate how to get to each word in the list (((FUN)) (IN THE) (SUN)).
 Answer-

Getting FUN:

step	result
start	(((FUN)) (IN THE) (SUN))
C..AR	((FUN))
C.AAR	(FUN)
CAAAR	FUN

Getting IN:

step	result
start	(((FUN)) (IN THE) (SUN)).
C..DR	((IN THE) (SUN))
C.ADR	(IN THE)
CAADR	IN

Getting THE:

STEP	RESULT
C...DR	(((FUN)) (IN THE) (SUN)).
C..ADR	((IN THE) (SUN))
C.ADR	(IN THE)
C.DADR	(THE)
CADADR	THE

Getting SUN:

step	Result
start	(((FUN)) (IN THE) (SUN)).
C...DR	((IN THE) (SUN))
C..DDR	((SUN))
C.ADDR	(SUN)
CAADDR	SUN

FINAL TABLE

WORD	FUNCTION
FUN	CAAAR
IN	CAADR
THE	CADADR
SUN	CAADDR

2.15) Using the list ((A B) (C D) (E F)), fill in the missing parts of
this table
Answer-

Function	Result
CAR	(A B)
CDDR	((E F))
CADR	(C D)
CDAR	(B)
CAAR	B
CDDAR	B
CAAR	A
CDADDR	(F)
CDADDR	F

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

The result of CAAR (FRED NIL) is an error, because the CAR function requires its argument to be a list, and FRED is not a list.

From Sebesta chapter 1 review questions

6) In what language is most of UNIX written?
- Most of UNIX is written in the C programming language.

7) What is the disadvantage of having too many features in a language?
- Having too many features in a programming language can make it complicated and harder to learn. It might also make the code less clear or less efficient because of extra or confusing features.

8) How can user-defined operator overloading harm the readability of a program?
- User-defined operator overloading can make the code harder to read because it can cause operators to behave in surprising ways. This can confuse other programmers who expect certain actions to work normally.

9) What is one example of a lack of orthogonality in the design of C?
- One example of how C isn't completely clear is that arrays and pointers are similar but can't always be used the same way. This can cause surprising issues sometimes.

10) What language used orthogonality as a primary design criterion?
- ALGOL 68 is used orthogonality as a primary design criterion.

11) What primitive control statement is used to build more complicated control statements in languages that lack them?
   -    The goto statement is often used as a primitive control statement to build more complicated control structures in languages that lack them.

12) What does it mean for a program to be reliable?
- A program is reliable if it always works as it should under normal conditions and without any mistakes.

13) Why is type checking the parameters of a subprogram important?
-Type checking makes sure that the inputs given to a subprogram are of the right kind. This helps stop mistakes when the program runs and makes the program safer and more reliable.

14) What is aliasing?

-Aliasing is a situation in programming when two or more variables point to the same place in memory. This can cause problems because if one variable is changed, it might also change the others, leading to errors or unexpected results.

15) What is exception handling?
-Exception handling is a way for a program to deal with errors that happen while it's running. It helps the program catch and manage these errors so that it doesn't crash.

16) why is readability important to writability?
- Readability is important to writability because it helps programmers understand and change the code easily. This makes it easier to write, fix, and make programs better.

20) What two programming language deficiencies were discovered as a
    result of the research in software development in the 1970s?
- Inadequate type checking and insufficient control structures.

21) What are the three fundamental features of an object-oriented programming language?
- The three fundamental features of an object-oriented programming language are:
i) Encapsulation
ii) Inheritance
iii) Polymorphism

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

   - Simula was the first language to support the three fundamental features of object-oriented programming.

23) What is an example of two language design criteria that are in direct conflict with each other?
   - Efficiency and readability

24) What are the three general methods of implementing a programming language?
   - The three general methods of implementing a programming language are
      i)   Compilation
      ii)   Pure interpretation
      iii)   Hybrid implementation

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

- A compiler produces faster program execution.

29) What are the advantages in implementing a language with a pure interpreter?
- The advantages of implementing a language with a pure interpreter are as following down
* Instant Execution: This feature is perfect for quick development and testing because it allows programs to run instantly without requiring a separate compilation phase.
* The ability of a pure interpreter to handle platform-specific characteristics enables the same code to run on various platforms.
* Debugging is made simple by the interpreter's line-by-line execution of the code, which makes it simpler to find and correct issues as they arise.