Kevin Gutierrez – Homework 1 – CSCI 330

Question 1:

2.2:

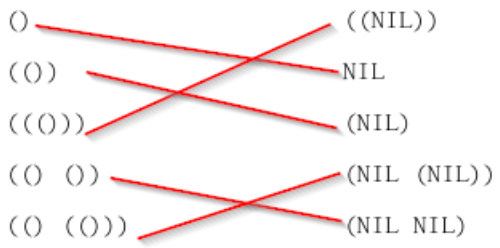
1. ((A) (B))
2. (A (B (C)))
3. (((A) (B)) (c))

2.4: ((BOWS ARROWS) (FLOWERS CHOCOLATES))

2.6:

EXERCISE

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.



2.13:

FUN **Step**	**Result**
Start	(((FUN))(IN THE)(SUN))
C...DR	((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)

CADADR	THE

SUN **Step**	**Result**
Start	(((FUN))(IN THE)(SUN))
C...DR	((IN THE)(SUN))
C..DDR	((SUN))
CADDR	(SUN)
CAADDR	SUN

2.15:

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
CAAR	A
CDADDR	(F)
CADADDR	F

2.16: It will error out because a CAR operation cannot be done on a single element (CAR only works on lists)

Question 2:

6. Which is the most popular markup language for Web development? – HTML

7. Why is a list of programming language evaluation criteria for the

development of software controversial? – It's difficult to get two computer scientists to agree on the value of language characteristics relative to others

8. How does the overall simplicity of a programming language strongly

affect its readability? – A language with a large number of basic constructs is more difficult to learn than one with a smaller number

9. Why is the VAX instruction design orthogonal? – A single instruction can use either registers or memory cells as its operands

10. Why does too much orthogonality cause problems? – It can lead to unnecessary complexity and could negatively affect readability

11. Explain how "writability" is used as a measure of how easily a language

can be used to create programs. – The writability of a language is relative to the application, therefore the writability of a language relative to writing a particular type of application (such as a GUI or a low level system app that runs at the system level) can measure it's ease of app development with respect to the domain.

12. Why is too much orthogonality a detriment to "writability?" – Errors in programs can go undetected when most combinations of primitives is legal; this can confuse the compiler

13. Give an example of expressivity in a language. – The for statement in java

14. What is type checking? – Testing for type errors in a program by the compiler or during program execution

15. Give an example of how the failure to type check, at either compile time

or run time, can led to countless program errors. – In early versions of C, if an int variable is passed into a function that expects a float type, the compiler wouldn't be able to detect that issue, and it wouldn't be detected at runtime which would lead to a program that appears to run correctly, but the value interpreted from the param would not match the value passed in (the float representation of an int in binary is not the same as the int value)

16. How is the total cost of a programming language calculated? – By summing the cost of training devs, the cost of writing programs in the language, the cost of executing the programs (the speed of execution, the cost of poor readability, and the cost of maintaining the program.

20. What two programming language deficiencies were discovered as a

result of the research in software development in the 1970s? – Incompleteness of type checking and inadequacy of control statements

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

Data abstraction (encapsulation), inheritance, and dynamic method binding (polymorphism)

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

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

24. What are the three general methods of implementing a programming language? – Compiler implementation, pure interpretation, hybrid interpretation

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

29. What are the advantages in implementing a language with a pure interpreter? – Source level debugging operations, ease of implementation, and flexibility for dynamic features

Question 3:

Sequence of CARs and CDRs that return x when applied to:

a. (a b x d)
b. (a (b (x d)))
c. (((a (b (x) d))))

for a: (car (cdr (cdr '(a b x d))))

for b: (car (car (cdr (car (cdr '(a (b (x d))))))))

for c: (car (car (cdr (car (cdr (car (car '(((a (b (x) d))))))))))

Question 4:

for a: (cons 'a (cons 'b (cons 'x (cons 'd nil))))

for b: (cons 'a (cons (cons 'b (cons (cons 'x (cons 'd nil)) nil)) nil))

for c: (cons (cons (cons 'a (cons (cons 'b (cons (cons 'x nil) (cons 'd nil))) nil)) nil) nil)