COS 333 Practical 1 Research

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Question 4.1 [3]

- It is said that TeX is Turing complete. By definition of a language being Turing complete, it means that TeX can be used to compute or solve any computational problem. This means that not only should it be able to be used for typesetting documents, but additionally be able to implement various algorithms to carry out a task autonomously. [1]
- Advantage: From the statement that TeX is Turing complete, we can deduce that the obvious advantage is the versatility of the language, since we are able to utilize it beyond it's typesetting capabilities. [2]
- Disadvantage: Although TeX is able to pass the Turing test (therefore considered Turing complete), that is not what the language was designed to do. Thus, any solution to computational problems, might not be as effective in comparison to other more specialised tools.

Question 4.2 [2]

An esoteric programming language, also referred to as esolang, is often times created for fun or to test the computational limits of programming languages. [3] They are often experimental or whimsical and not designed with the intention of being efficient or to offer an elegant solution. [4]

Question 4.3 [5]

- Esoteric programming languages are amusing diversions.
  - Esoteric languages in the world of computing are rarely used for any practical reasons. [5] They are difficult to implement to address any current problems that need solving.
  - The languages are often created with a sense of humor or joke to them, for example the language Shakespeare,My Precious or EMO. Hence one could argue, given the information above, that these languages are just amusing jokes to be enjoyed by programmers and researchers alike.
- Esoteric programming languages serve a purpose other than entertainment.
  - Esoteric programming languages challenge the users into a different way of thinking, forcing then to use creative problem-solving skills, since the language is usually unconventional by design. [6]
  - These languages often inspire alternative features to languages.
  - Learning or becoming proficient in an esoteric language, or even writing one, would be very beneficial in truly understanding the fundamentals of how programming languages work. Since more popular languages are designed to be intuitive, and not very complex, anyone using the languages would not necessarily need any fundamental knowledge of the processing of the language. [7]

Question 4.4 [10]

-	Whitespace [8]	LOLCODE [9]
Designer	Edwin Brady and Chris Morris	Adam Lindsay
Year of initial Design	2002 (University of Durham)	2007
Characteristics	Characters, such as the space, tab and newline are of use. Any other characters are ignored (they are interpreted as comments). Thus the whole language consists of combinations of white space characters. Spaces are often interpreted as 0s and tabs as 1s, in the conversion to binary.	LOLCODE drew inspiration from the LOLcats internet meme page, hence some of the constructs are slag words. This includes "KTHXBYE" (OK, thanks, bye) - the end of the program,"TLDR" (is too long; didn't read) - end of a multi-line comment, and BTW (is by the way) - start of a single line comment. [10]
Turing completeness	Whitespace is Turing Complete	LOLCODE is Turning complete

Question 4.5 [2]

- Bash can be considered a programming language since it allows you to complete a task with set of instructions, by allowing you to write scripts (shell scripts with an .sh extension) and execute within the command-line shell itself. It also has its own syntax. [11]
- Bash does not make use of any data structures, functions, or types, nor does it have any floating point arithmetic.[12] It does not allow you to do much. It is also associated with the Unix system, and would be very difficult to use on top of any other operating system.

Question 4.6 [2]

ALF (Algebraic Logic and Functional) programming language is a combination of logic and functional programming. [13]

Question 4.7 [5]

Visual Logic software for teaching program design.

- Syntax
  - Visual logic makes uses flowcharts with objects to represent a programming action.
  - It creates a visual representation of the program's logic.
  - Typically, from experience, it has a start and end point, decision points and other programming constructs objects included.
- Semantics
  - Visual logic languages are executed sequentially. The objects or symbols that appear first in the flowchart, are executed first. Loops, conditionals, or other structures of this nature are the only objects that can alter the sequential execution of the program.
- Advantage
  - It is much easier for beginners to understand since a graphical representation of the program's logic is given rather than traditional text.
  - It makes it easier to see the flow of logic and to detect any faults in said logic. [14]
- Disadvantage
  - The built in features are not enough. [15] Students are able to grasp the basic concepts of program design, however the skills learnt from the visual tool cannot be transferred onto text based language environments. It thus makes the transition difficult for beginners.

Question 4.8 [1]

Dr.Memory is a tool, similar to Valgrind, for aiding in finding memory errors in your code. This includes errors such as memory leaks, uninitialised and unaddressable memory within your code. [16]

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