Homework 1

Introduction to programming languages. Regular expression.

1. N.A.
2. B
3. List three Turing award winners whose election is largely related to their contribution to Programming Languages and their foundation. **Each entry in your list should contain the programming language contribution (in a few sentences) of the corresponding winner.**
    a. Tony Hoare
        i. Tony Hoare is known for his research in axiomatic specification of programming languages. He developed a logical system that moved away from flowcharts and instead reasoned with specifications of the behavior of statements. His specification of statement behavior is known as Hoare triples.
    b. Edsger W. Dijkstra
        i. Dijsktra is responsible for a lot of developments in computer science. When it comes to programming languages specifically, he argued that the GO TO statement was a symptom of faulty code and it should be eliminated. Additionally, he thought that programming should be a mathematical discipline because of the software crisis.
    c. Robert W. Floyd
        i. Floyd is credited with initiating the field of programming language semantics. Semantics, in this context, focuses on the mathematical rigor that works as the basis for programming languages. The processes a computer follows when it executes a program in a specific programming language is what is described by semantics.
4. Compilation vs Interpretation
    a. Compilation
        i. Compilation is the translation of a higher-level language program to a lower-level language program (typically machine language). Once a program's code is completed in a higher-level language, it will all be translated at once. The user may execute the compiled program arbitrarily.
    b. Interpretation
        i. Interpretation is slower than compilation, but it is easier to debug in. The reason is because the interpreter will run each line after it is translated.

5. You are a Pascal teacher (a very good programmer using assembly language (i.e., machine language) of your local machine). You are given only the following programs
    a. I will use the compiler written in P-code so I can translate their Pascal programs to one in P-code for my local machine to execute.
    b. You can produce a Pascal to machine language compiler that is written in machine language by writing a P-code interpreter into locally available language. Once the interpreter is written/translated, you can pass the P-code version of the Pascal compiler on the P-code interpreter. The P-code interpreter will then use the P-code generated by the Pascal compiler to translate it to the machine language used by the local system. The new machine code generated by the P-code interpreter can be the Pascal compiler that was translated into P-code by the Pascal compiler.
6. Regular expression
    a. Natural numbers
        i. Digit -> 0|1|2|3|4|5|6|7|8|9
        ii. Natural -> (|1|2|3|4|5|6|7|8|9) Digit*
    b. all strings over alphabet {a, b, A, B} that starts with capital letters.
        i. Alphabet -> a | b | A | B
        ii. Capital -> A | B
        iii. All_strings - > A | B Alphabet*
    c. Numeric constants in a language X . A numeric constant is an octal, decimal, or hexadecimal integer. An octal integer begins with 0, and may contain only the digits from 0 to 7. A hexadecimal integer begins with 0x or 0X, and may contain the digits from 0 to 9 and letters from a/A to f/F. Decimal integers are those we normally use in our daily life.
        i. Octal -> (0|1|2|3|4|5|6|7|)(0|1|2|3|4|5|6|7|)*
        ii. Hex -> (0|1|2|3|4|5|6|7|8|9|a|b|c|d|e|f) (0|1|2|3|4|5|6|7|8|9|a|b|c|d|e|f)*
        iii. Deci-> (0|1|2|3|4|5|6|7|8|9) (0|1|2|3|4|5|6|7|8|9)*
        iv. Numc -> Octal | Hex| Deci
7. The set of all strings that start with the character a,b, or an empty string
8. Given an input (x+y5)*5 /* This is a comment */ 2x, what are the tokens recognized by the DFA in Page 12 of the slides (for regular expressions)?
    a. (
    b. X
    c. +
    d. Y5
    e. *

f. 5
g.)
h. 2
i. X