

Homework Assignment #1

Due: Friday, October 7

1. Give a regular expression for each of the following:
 - a. Complex numbers (with integral real and imaginary parts), e.g. $3-2i$, $-12+4i$, 17 , and $-4i$.
 - b. C non-negative integer constants in decimal, octal (which begin with 0 and have only digits in base 8), or hexadecimal (which begin with 0x or 0X and are followed by digits in base 16, which include lower and upper-case letters A through F) notation.
2. Convert the following RE into an NFA: $a((b|a^*c)x)^*|x^*a$
3. a. Convert the following regular expression (where the alphabet is 0, 1, and E) into an NFA, following the mechanical rules developed in class.
 $(0|1)(0|1)^* | (0|1)(0|1)^* E (0|1)(0|1)^*$
 - b. Convert this NFA into a DFA, following the algorithm from class. Be sure to label the NFA states and to label each of the DFA states with a set of NFA states.
4. a. The regular grammar specifying lexically correct programs for MiniJava is given as follows:
$$\text{Program} ::= (\text{Token}|\text{Whitespace})^*$$
Modify this specification to require that all tokens be separated by whitespace, and optionally allow whitespace at the start and/or end of the program.
 - b. Why does this language change remove the need for the longest-match meta-rule?
 - c. Do you think this would be a good language design change?

Produce a hard-copy of your answers and turn them in to the TA by the start of class on the due date.

Do these exercises individually, not with your project partner.