Please show the completed worksheet to your lab instructor for attendance credit.

Problem 1: INFIX/POSTFIX/PREFIX - Convert the following infix expressions to prefix and postfix form, and draw the expression tree for each. Assume the normal Java operators and precedence rules.

a) \((a \times b) + c\)

PREFIX:

POSTFIX:

EXPRESSION TREE:

b) \(a \times b + c / d + 3\)

PREFIX:

POSTFIX:

EXPRESSION TREE:

c) \(a + 4 \times (e + d / 2)\)

PREFIX:

POSTFIX:

EXPRESSION TREE:
Problem 2: REGULAR EXPRESSIONS - Write the regular expression that matches the corresponding string described in the problems below. Alphanumeric means an upper or lower case letter or digit.

a) Write the regular expression for a variable name in a programming language that must begin with an uppercase character, followed by any number of alphanumeric characters, underscores ('_') or periods ('.'), but should always end with an alphanumeric character.

REGULAR EXPRESSION:

b) Write the regular expression for a file name which must begin with an alphabetical character, followed by up to six alphanumeric characters, followed by a dot and then exactly three letters, upper or lowercase.

REGULAR EXPRESSION:

c) Write the regular expression for all strings that begin with one or more instances of the letter ‘a’, followed by one or more numeric characters and ending with zero or more instances of the letter ‘z’.

REGULAR EXPRESSION:

d) List three strings that follow this regular expression: [a-zA-Z]*[\%-

(i)

(ii)

(iii)
Problem 3: FORMAL GRAMMARS - Write production rules in Backus-Naur Form (BNF) that produce the syntax described below.

a) Write the production rules for a variable name in Java that can start with an upper or lower case letter, underscore ('_') or dollar sign ('$'), and can contain any number or sequence of the same characters and digits.

PRODUCTION RULES:

b) Write the production rules for all palindromes that contain only digits. A palindrome is a string that reads the same forwards and backwards. For example, 1, 121, 333, 12321, 456654, 7899987, and 12345654321 would be palindromes.

PRODUCTION RULES:

c) Given the following production rules, give three examples of numbers that are legal in the grammar defined by the rules. These are the rules for Python floating point values.

floatnumber ::= pointfloat | exponentfloat
pointfloat ::= [intpart] fraction | intpart .
exponentfloat ::= (intpart | pointfloat) exponent
intpart ::= <digit>+
fraction ::= . <digit>+
exponent ::= (e | E) [+ | -] digit+
digit ::= 0 | 1 | . . . | 9

(i)
(ii)
(iii)