

COS 301 Fall 2009
Homework #1 Due Thursday Oct 1

Problems are one point each.

1 - 4 Text exercises pp. 55-56 Ex. 2.3, 2.4, 2.8, 2.10

5. Find and list BNF grammars for an IF statement in Perl, Python and Ada. You need only list the production for the IF statement and do not need to list productions for other non-terminals. Then translate the following IF statement from PHP into each of three languages.

```
if ($x == 1) {  
    $y = $z;  
    $x = 10;  
} else  
    $x -= 1;
```

Note that variable names are always preceded by \$ in PHP., == is the relational equals operator, = is the assignment operator, and -= is subtraction with assignment.

6. Given grammar $G = \{ P, T, N, S \}$ where
 $T = \{ a, b, c \}$ $N = \{ A, B, C, W \}$ $S = \{ W \}$
P consist of the rules:

1. $W \rightarrow AB$
2. $A \rightarrow Ca$
3. $B \rightarrow Ba \mid Cb \mid b$
4. $C \rightarrow cb \mid b$

For each of the following strings show why the string is or is not in $L(G)$.

- a) baaab b) acbbb c) cbabbba d) cbacbb

7. Write a context-free BNF grammar for signed floating point numbers with optional exponents, using the following rules:

- a leading sign (+ or -) is optional
- exactly one non-zero digit must precede the decimal point.
- one or more digits may follow the decimal point
- exponents are optional, if present are in the form of a letter E followed by a non-optional sign (+ or -) followed by an integer exponent

Examples are

-5.0000112345E+12 4.2E+2 2.0E-100 1.0000001 1.9

8. Express the grammar for the previous problem in EBNF

9-10. Provide BNF translation rules for EBNF metabackets and metaparentheses similar to the translation rules on p. 37 of the text for metabraces.