PURDUE UNIVERSITY FORT WAYNE
Department of Computer Science
COLLEGE OF ENGINEERING, TECHNOLOGY, AND COMPUTER SCIENCE

CS 350 Programming Language Design
Homework Assignment (2)

Objectives

1. Understand language grammar written in BNF
2. Perform derivation on grammar rules
3. Draw parse trees
4. Understand operational semantics

Description

Q1. Consider the given grammar:

<assign> → <id> = <expr>

<id> → A | B | C

<expr> → <expr> + <term>

| <term>

<term> → <term> * <factor>

| <factor>

<factor> → (<expr>)

| <id>

a. (15 points) draw a parse tree for :

```
B = A * (C * (B + A))
```

b. (15 points) Show a rightmost derivation for the statement in a.

c. (15 points) Rewrite the grammar to add the ++ and -- operators

d. (15 points) Rewrite the grammar in EBNF

Q2. Consider the Ruby `case` statement:

a. (20 points) Describe the syntax in BNF

b. (20 points) Using the virtual machine instructions given below, give an operational semantic definition of the statement.

ident = var

ident = ident + 1

ident = ident – 1

goto label

if var relop var **goto** label

In these statements, relop is one of the relational operators from the set {=, <>, >, <, <=, <=}, ident is an identifier, and var is either an identifier or a constant. These

Note:

Hand written answers are OK for Q1 parts **a** and **b**. In this case, comine a neatly organized scanned version of your answer with your "pdf" submission file.