

Backus–Naur form

EECS 368 sp'18 Homework 1 (5pts)

Due: Friday 2nd Feb, 10am (start of class)

Instructions: Complete problems 1 and 2 *neatly* on this sheet and/or **staple** any additional sheets to this one and write your name on every page and number them (accidents happen).

1. Date Format BNF

- Write a BNF (or EBNF) for the common date format in the USA, MM/DD/YYYY. For example. January 1st 1970 would be expressed 01/01/1970. September 26th, 1991 = 09/26/1991. For the purpose of this exercise, you may ignore the fact that months have different numbers of days. For example a VALID statement in your date language could be 02/31/1901 despite the fact that February never has more than 29 days. Just be sure that clearly nonsensical dates such as 13/03/199, 2/32/2001 etc, are rejected by your language definition.
- Create a parse tree to show that 01/23/4567 is valid in your language definition.

2. English Sentence BNF

- Write a BNF (or EBNF) for a sentence in English. Remember that the first word of a sentence must begin with a capital letter and end with a period, question mark, or exclamation point (or a combination??!). For simplicity, you can limit your sentences **not** to include: parentheses, quotations, semi-colons, colons or any other special symbol except **commas** and **apostrophes**. You need not worry about semantics like subject-verb agreements, etc. Focus on the fact that words are made of letters and sentences are made of words. Words do not have random capitalizations.
Tip: remember, a sentence could contain commas (you need not worry about how many, but can't end with one!), and a word could contain one apostrophe (and never as the first letter)!

- Write out the **parse tree** given your (e)BNF for the following sentence:
"I love lamp."

$\langle \text{Date} \rangle ::= \langle \text{Month} \rangle \langle \text{slash} \rangle \langle \text{Day} \rangle \langle \text{slash} \rangle \langle \text{Year} \rangle$

$\langle \text{NoZeroDigit} \rangle ::= [1..9]^+$

$\langle \text{Digit} \rangle ::= \langle \text{NoZeroDigit} \rangle | "0"$ - 0.25
This format allows for leading zeros in

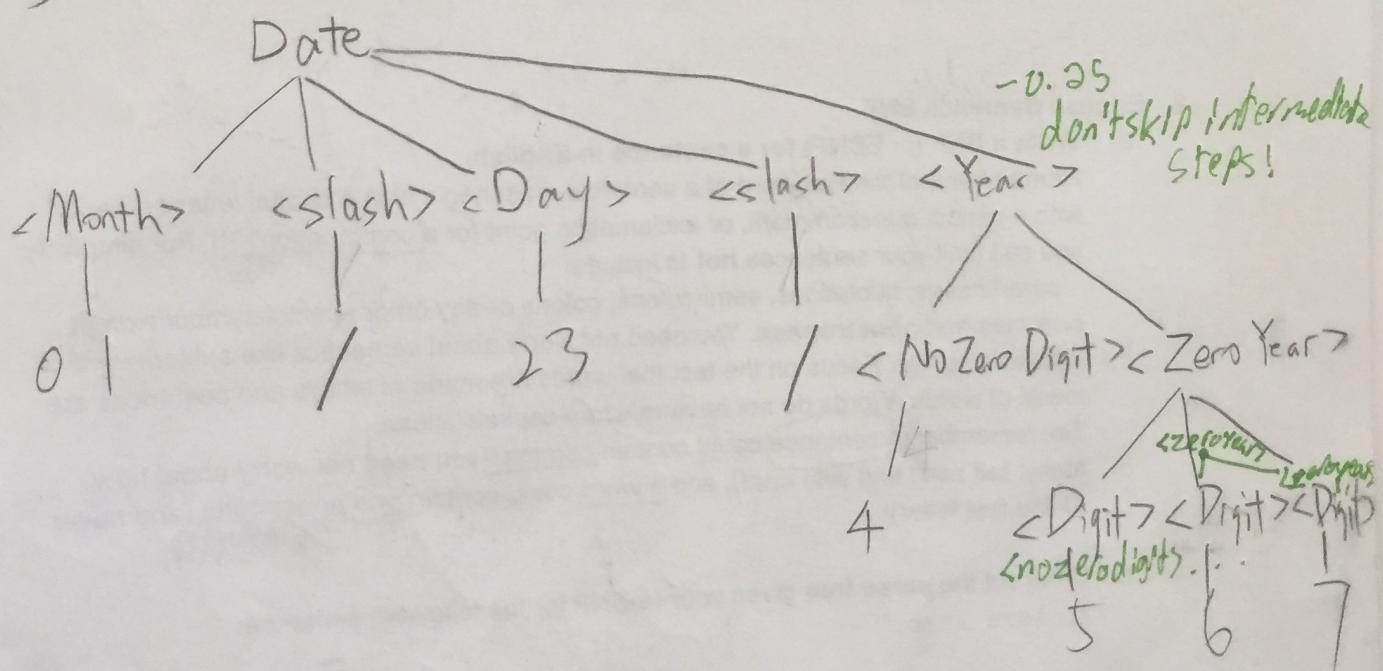
$\langle \text{Year} \rangle ::= \langle \text{NoZeroDigit} \rangle | \langle \text{NoZeroDigit} \rangle \langle \text{ZeroYear} \rangle$ year

$\langle \text{ZeroYear} \rangle = \langle \text{Digit} \rangle | \langle \text{Digit} \rangle \langle \text{ZeroYear} \rangle$

$\langle \text{slash} \rangle = "/"$

$\langle \text{Month} \rangle ::= "01" | "02" | "03" | "04" | "05" | "06" | "07" | "08" | "09" | "10" | "11" | "12"$

$\langle \text{Day} \rangle ::= \langle \text{Month} \rangle | [13\dots 31]^{+}$ means "at least one"
meaning can have day 133



01/23/4567

$\langle \text{End} \rangle ::= "?" | "!" | \text{End}$

$\langle \text{CapitalLetter} \rangle ::= [\text{A} \dots \text{Z}]^+$

$\langle \text{Letter} \rangle ::= [\text{a} \dots \text{z}]^+$

$\langle \text{Whitespace} \rangle ::= " " \cup \langle \text{Letter} \rangle$

→ 0.25: words starting with capital letter can occur in middle of sentence.

$\langle \text{Word} \rangle ::= \langle \text{Letter} \rangle \mid \langle \text{Letter} \rangle \langle \text{Word} \rangle$

$\langle \text{Apo} \rangle ::= " \dots "$

$\langle \text{Com} \rangle ::= ", "$

$\langle \text{FirstWord} \rangle ::= \langle \text{CapitalLetter} \rangle \langle \text{Word} \rangle \mid \langle \text{CapitalLetter} \rangle$

$\langle \text{Sentence} \rangle ::= \langle \text{FirstWord} \rangle \langle \text{Whitespace} \rangle \langle \text{Middle} \rangle \langle \text{End} \rangle \mid$
 $\langle \text{FirstWord} \rangle \langle \text{Com} \rangle \langle \text{Middle} \rangle \langle \text{End} \rangle \mid \langle \text{FirstWord} \rangle \langle \text{End} \rangle$

$\langle \text{Middle} \rangle ::= \langle \text{Word} \rangle \mid \langle \text{Middle} \rangle \langle \text{Whitespace} \rangle \langle \text{Middle} \rangle$

$\langle \text{Middle} \rangle \langle \text{Com} \rangle \langle \text{Whitespace} \rangle \langle \text{Middle} \rangle$

