Program #1

Given a CFG of arithmetic expressions below,

\[
\begin{align*}
E & \rightarrow E+T \mid E-T \mid T \\
T & \rightarrow T*X \mid T/X \mid X \\
X & \rightarrow F^X \mid F \quad \text{// Exponential} \\
F & \rightarrow (E) \mid B \\
B & \rightarrow N.N \mid N \quad \text{// Floating point} \\
N & \rightarrow D \mid DN \\
D & \rightarrow 0 \mid 1 \mid \ldots \mid 9
\end{align*}
\]

Write recursive descent program based on the CFG & evaluate the arithmetic expression.

Upload your source code to the FTP server.
IP 140.113.208.51 : 21
Username pl2008
Password pl2008

Please zip all your source codes into one zip file and name it with your student id.
Ex: 9xxxxxx.zip

Note
- **Upload your code to FTP before 11/16 24:00PM**
- **Demo to TAs at 11/17 13:00 – 21:00, EC615**
- **Hint:**
  a) Eliminate left recursion.
  b) Make the resulting CFG of part a) an attribute grammar to evaluate the value of an expression.
  c) Write your program based on the attribute grammar of part b).
- Please post on BS2 CS-ProgLang if you have any problems.

Score:  
Correct expression – 80%
Correct output – 20%
Bonus – 10%
Input / Output Constrain:
1) There are total five operators (+, -, *, /, ^), and you should take ( ) into consideration.
2) There are no spaces between operands and operators
   Ex: 2+3, 56, 2^3
3) Four output conditions:
   Case 1: if the expression is correct, output the right answer.
   Case 2: if there are losses for operands of operators, print out “Digit expected”.
   Case 3: if there are any illegal numbers, print out “Illegal number”.
   Case 4: if there are losses for brackets, print out which bracket is loss.

Sample:
Enter: 615
Output: 615

Enter: 615+5–3*(120–20)
Output: 320

Enter: 3.14+6.15*2
Output: 15.44

Enter: 615+
Output: Digit expected

Enter: 615+15b
Output: Illegal number

Enter: (615+15
Output: ) expected

Enter: ((700-100)+50)*2
Output: 1300

Enter: ((230))
Output:230

Enter: (230
Output:) expected

Enter:230+20-100
Output:150

Enter:24-5*4
Output: 4