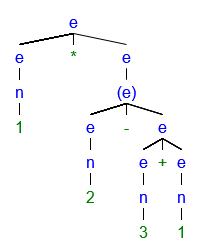
Daniel Frey

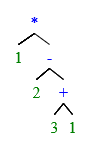
CS 3160-001

Assignment 2

9/19/18

* 1. BNF: e::= n | e+e | e-e | e\*e | (e), derive: 1\*(2-3+1)  
     Using leftmost derivation:  
     e 🡪 e\*e, e 🡪 n\*e, e 🡪 n\*(e), e 🡪n\*(e-e), e 🡪n\*(n-e), e 🡪n\*(n-e+e),   
     e 🡪n\*(n-n+e), e 🡪n\*(n-n+n)  
       
     Assuming n::= 0 | 1 | ... | 9  
     e 🡪 e\*e, e 🡪 n\*e, e 🡪 1\*e, e 🡪1\*(e), e 🡪1\*(e-e), e 🡪1\*(n-e), e 🡪1\*(2-e),   
     e 🡪1\*(2-e+e), e 🡪1\*(2-n+e), e 🡪1\*(2-3+e), e 🡪1\*(2-3+n), e 🡪1\*(2-3+1)
  2. Parse Tree for 1\*(2-3+1) derivation:  
     
  3. This BNF is ambiguous. A different tree is produced depending on the order and the derivation.

|  |  |
| --- | --- |
| Ex: 1+2-4 | |
| Tree 1:  C:\Users\Daniel Frey\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\1628BD53.tmp | Tree 2:  C:\Users\Daniel Frey\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\243035D9.tmp |

* 1. AST  
     

1. Reduce to normal form **(Using method in class)**:
   1. **(λx. x + y) y** 🡪 y + y 🡪 2y
   2. **(λx. λy. x + 5 \* y) y x** 🡪 (λy. y + 5 \* y) x 🡪 x + 5 \* x 🡪 6x
   3. **λx. λy. (λz. z + 1) y** 🡪 λx. (λz. z + 1) 🡪 no further reduction
   4. **(λx. (λy. y x) (λz. x z)) (λy. y y)** 🡪 (λy. y (λy. y y)) (λz. (λy. y y) z) 🡪   
      (λz. (λy. y y) z) (λy. y y) 🡪 (λy. y y) (λy. y y) 🡪 ... 🡪 (λy. y y) (λy. y y)
   5. **(λx. λy. x + y) y z** 🡪 (λy. y + y) z 🡪 y + y 🡪 2y