

Lab Three

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1 PROBLEM 4.7 - CRAFTING A COMPILER

a) num plus num times num plus num \$

=> E \$

=> T plus E \$

=> F plus E \$

=> num plus E \$

=> num plus T times F \$

=> num plus F times F \$

=> num plus num times F \$

=> num plus num times (E) \$

=> num plus num times T plus E \$

=> num plus num times F plus E \$

=> num plus num times num plus E \$

=> num plus num times num plus T \$

=> num plus num times num plus F \$

=> num plus num times num plus num \$

b) num times num plus num times num \$

=> E \$

=> T \$

=> T times F \$

=> T times num \$

=> F times num \$

=> (E) times num \$

=> T plus E times num \$

=> T plus T times num \$

=> T plus F times num \$

=> T plus num times num \$

=> T times F plus num times num \$

=> T times num plus num times num \$

=> F times num plus num times num \$
=> num times num plus num times num \$

c) The left-most will take the expression all the way on the left and break it down until it can't anymore, then move to the right until the sentence is built. The right-most is the opposite. It builds the sentence by breaking down the expression at the end (right) and working its way backwards until it can't break the sentence down anymore.

2 PROBLEM 5.2C - CRAFTING A COMPILER

Recursive descent parser:

```
start(){  
  add(start);  
  value();  
}
```

```
value(){  
  if(num){  
    addNode(num);  
  } else {  
    addNode(lparen);  
    expr();  
    addNode(rparen);  
  }  
}
```

```
expr() {  
  if(plus) {  
    add(plus)  
    value(value1)  
    value(value2)  
  } else {  
    add(prod) {  
      values()  
    }  
  }  
}
```

```
values(values){  
  if( $\lambda$ )  
    return  
  }elseif(num){  
    add(num)  
    values()  
  }elseif(lparen){  
    value()  
  }  
}
```

3 PROBLEM 4.2.1 - DRAGON

a) Left-most derivation $SS^* \Rightarrow SS+S^* \Rightarrow aS+S^* \Rightarrow aa+S^* \Rightarrow aa+a^*$

b) right-most derivation $SS^* \Rightarrow Sa^* \Rightarrow SS+a^* \Rightarrow Sa+a^* \Rightarrow aa+a^*$

c)

