Name_____ **CSE431 – Quiz 4**
ID#_____ **4/02/14**

Below is a very simple grammar used for addition expressions. Complete the semantic actions for this grammar so that the parser can create an abstract syntax tree. You may assume that any node types and methods you need have been defined – all you need to do is fill in the semantic actions.

```
E
     ::= E:e + T:t
     {:

        RESULT =                                                    :}

     | T:t
     {:

        RESULT =                                                    :}
     ;

T
     ::= ( E:e )
     {:

        RESULT =                                                    :}

     | id:i
     {:

        RESULT =                                                    :}

     | num:n
     {:

        RESULT =                                                    :}

     ;
```

(Extra credit, 3 points) Sketch the AST that would be generated by your implementation for the expression:

```
(9 + x) + 2
```

To receive credit, your AST must match the above implementation. Also, you must indicate which part of the above expression corresponds with each node of your AST.