

```

1  import components.naturalnumber.NaturalNumber;
10
11 /**
12  * Program to evaluate XMLTree expressions of {@code NN}.
13  *
14  * @author Yiming Cheng
15  *
16  */
17 public final class XMLTreeNNExpressionEvaluator {
18
19     /**
20      * Private constructor so this utility class cannot be instantiated.
21      */
22     private XMLTreeNNExpressionEvaluator() {
23     }
24
25     /**
26      * Evaluate the given expression.
27      *
28      * @param exp
29      *      the {@code XMLTree} representing the expression
30      * @return the value of the expression
31      * @requires <pre>
32      * [exp is a subtree of a well-formed XML arithmetic expression] and
33      * [the label of the root of exp is not "expression"]
34      * </pre>
35      * @ensures evaluate = [the value of the expression]
36      */
37     private static NaturalNumber evaluate(XMLTree exp) {
38         NaturalNumber evl = new NaturalNumber2();
39         if (exp.numberOfChildren() > 0) {
40             //find the xml's label which is times, and do the corresponding actions
41             if (exp.label().equals("times")) {
42                 evl.copyFrom(evaluate(exp.child(0)));
43                 evl.multiply(evaluate(exp.child(1)));
44             //find the xml's label which is divide, and do the corresponding actions
45             } else if (exp.label().equals("divide")) {
46                 if (!evaluate(exp.child(1)).isZero()) {
47                     evl.copyFrom(evaluate(exp.child(0)));
48                     evl.divide(evaluate(exp.child(1)));
49                     //report the error when the divisor would be smaller than 0
50                 } else {
51                     Reporter.fatalErrorToConsole(
52                         "The divisor would be more than 0.");
53                 }
54             //find the xml's label which is plus, and do the corresponding actions
55             } else if (exp.label().equals("plus")) {
56                 evl.copyFrom(evaluate(exp.child(0)));
57                 evl.add(evaluate(exp.child(1)));
58             //find the xml's label which is minus, and do the corresponding actions
59             } else if (exp.label().equals("minus")) {
60                 if (evaluate(exp.child(0))
61                     .compareTo(evaluate(exp.child(1))) >= 0) {
62                     evl.copyFrom(evaluate(exp.child(0)));
63                     evl.subtract(evaluate(exp.child(1)));
64                 } else {
65                     //report the error when the result would be smaller than 0
66                     Reporter.fatalErrorToConsole(
67                         "The second one would be smaller than the first one");
68                 }
69             }
70         } else {

```

```
71         String word = exp.attributeValue("value");
72         evl = new NaturalNumber2(word);
73     }
74     return evl;
75 }
76
77 /**
78  * Main method.
79  *
80  * @param args
81  *         the command line arguments
82  */
83 public static void main(String[] args) {
84     SimpleReader in = new SimpleReader1L();
85     SimpleWriter out = new SimpleWriter1L();
86
87     out.print("Enter the name of an expression XML file: ");
88     String file = in.nextLine();
89     while (!file.equals("")) {
90         XMLTree exp = new XMLTree1(file);
91         out.println(evaluate(exp.child(0)));
92         out.print("Enter the name of an expression XML file: ");
93         file = in.nextLine();
94     }
95
96     in.close();
97     out.close();
98 }
99
100 }
101
```