

```
1 import components.simplereader.SimpleReader;
2
3
4
5
6 // DAVID PARK IS AUTHOR
7
8 public final class Newton4 {
9
10     private Newton4 () {}
11
12
13     private static double sqrt(double x, double relativeError) {
14
15         double guess = x;
16         double newGuess;
17
18         if (x == 0) {
19             return 0;
20         }
21
22         while (true) {
23             newGuess = 0.5 * (guess + x / guess);
24             if (Math.abs(newGuess - guess) < relativeError) {
25                 break;
26             }
27             guess = newGuess;
28         }
29         return guess;
30     }
31
32     /**
33      * Main method.
34      *
35      * @param args
36      *      the command line arguments
37      */
38     public static void main(String[] args) {
39         SimpleReader in = new SimpleReader1L();
40         SimpleWriter out = new SimpleWriter1L();
41
42         out.println("Enter the relative error: ");
43         double relativeError = in.nextDouble();
44
45         out.println("enter a number to calculate its sqrt");
46         double x = in.nextDouble();
47
48         while (x >= 0) {
49             double result = sqrt(x, relativeError);
50             out.println(result);
51
52             out.println("Enter another number. (neg to cancel)");
53             x = in.nextDouble();
54         }
55         in.close();
56         out.close();
57     }
58
59 }
60
```