Verification-Driven Program Development
Exercise Sheet, Week 1

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Exercises

1. Install Dafny (`https://dafny.org/dafny/Installation`).
2. Write a function `funAbs` that returns the absolute value of a natural number.
3. Implement a method `computeAbs` that computes the absolute value of a natural number.
4. Have Dafny prove that `computeAbs` implements `funAbs`.
5. Write another specification for `computeAbs` and prove it.
6. Do the tasks above for `max2` instead of `abs`.
7. Implement a method `max3` that computes the maximum of three numbers.
8. Implement a recursive method `computeFib` that computes the `n`th Fibonacci number.
9. Implement a method `search` that computes the position of an element in an array.
10. Implement a method `minArray` that computes the minimum in an array of integers.
11. Implement a method `maxArray` that computes the maximum in an array of integers.
12. Make the methods search from the last element towards the first.
13. Work in groups of two: implement, specify, and verify a method to compute the `2nd` maximum value in an array of integers.

Useful Links

1. Main webpage:

   `https://dafny.org/`

2. Installation instructions:

   `https://dafny.org/dafny/Installation`

3. Visual Studio Code Dafny Plug-in:

   `https://marketplace.visualstudio.com/items?itemName=dafny-lang.ide-vscode`

4. Cheatsheets:

   `https://dafny.org/latest/DafnyCheatsheet.pdf`

   `https://dafny.org/latest/Dafny-cheat-sheet.pdf`

5. Tutorial:

   `https://dafny.org/latest/OnlineTutorial/guide`

6. Documentation:

   `https://dafny.org/latest/toc`