MATH471 — Introduction to Numerical Methods

Algorithms in LaTeX

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Content of the document

- Details on how to write clear pseudocode
- Basic LaTeX source code for writing pseudocode

1 Sample algorithm

Two main requirements when writing pseudocode:

- The Input/Output lines must appear at the top;
- The algorithm must be indented, and the beginning/end of loops and conditional statements easily identified;

Line numbering is optional, but highly recommended when commenting or explaining part of the pseudocode.

Algorithm 1: Algorithms in the homework
Input : this file
Output: nice algorithms in the homework

```
1  Function AlgoHw(this file):
2      download file;
3      open file;
4      compile file;
5      while not at end of this document do
6          read;
7          if understand then
8              go to next line;
9              current line becomes this one;
10         else if want to know more on algorithms in LaTeX then
11             refer to algorithm2e documentation
12         else
13             restart reading from the beginning;
14         end if
15     end while
16     for exercise ← 1 to 7 do
17         if algorithm is requested then
18             solve the problem;
19             A[exercise] ← write the algorithm in LaTeX;
20         end if
21     end for
22     return A
23 end
```

2 Sample LaTeX code

The above pseudocode is generated using the following LaTeX source code.

```
\documentclass{article}
\usepackage[linesnumbered,ruled,longend]{algorithm2e}
\usepackage[colorlinks=true,linkcolor=blue]{hyperref}

\SetKwInOut{Input}{Input}
\SetKwInOut{Output}{Output}
\SetKwProg{Fn}{Function}{\string:}{end}
\SetKwFunction{algohw}{AlgoHw}

\begin{document}
\begin{algorithm}[H]
  \Input{this file}
  \Output{nice algorithms in the homework}
  \BlankLine
  \Fn{\algohw{this file}}{
    download file\;
    open file\;
    compile file\;
    \While{not at end of this document}{
      read\;
      \uIf{understand}{
        go to next line\;
        current line becomes this one\;
      }
      \uElseIf{want to know more on algorithms in \LaTeX} {refer to
\href{http://tug.ctan.org/tex-archive/macros/latex/contrib/algorithm2e/doc/algorithm2e.pdf}
{algorithm2e documentation}}
      \Else {restart reading from the beginning\;}
    }
    \For{exercise $\leftarrow$ 1 \KwTo 7}{
      \If{algorithm is requested} {
        solve the problem\;
        A[$exercise$] $\leftarrow $ write the algorithm in \LaTeX\;
      }
    }
    \KwRet{A}
  }
  \caption{Algorithms in the homework}
\end{algorithm}
\end{document}
```