

CSSE3100 Crib Sheet

Exam Format

The confirmed format of the exam is:
Q1 weakest precondition reasoning.
Q2 method specification and loop invariants.
Q3 recursion and termination metrics.
Q4 classes and data structures.
Q5 lemmas and functional programming

This section will be removed before the exam

Question 1

book Default is two-sided.
report No `\part` divisions.
article No `\part` or `\chapter` divisions.
letter Letter (?).
slides Large sans-serif font.

Used at the very beginning of a document:
`\documentclass{class}`. Use `\begin{document}` to start contents and `\end{document}` to end the document.

Common documentclass options

10pt/11pt/12pt Font size.
letterpaper/a4paper Paper size.
twocolumn Use two columns.
twoside Set margins for two-sided.
landscape Landscape orientation. Must use dvips
-t landscape.
draft Double-space lines.
Usage: `\documentclass[opt,opt]{class}`.

Packages

fullpage Use 1 inch margins.
anysize Set margins: `\marginsize{l}{r}{t}{b}`.
multicol Use n columns: `\begin{multicols}{n}`.
latexsym Use L^AT_EX symbol font.
graphicx Show image: `\includegraphics[width=x]{file}`.
url Insert URL: `\url{http://...}`.
Usage: `\usepackage{package}`

Title

`\author{text}` Author of document.
`\title{text}` Title of document.
`\date{text}` Date.

These commands go before `\begin{document}`. The declaration `\maketitle` goes at the top of the document.

Miscellaneous

`\pagestyle{empty}` Empty header, footer and no page numbers.
`\tableofcontents` Add a table of contents here.

Document structure

`\part{title}` `\subsubsection{title}`
`\chapter{title}` `\paragraph{title}`
`\section{title}` `\subparagraph{title}`
`\subsection{title}`
Use `\setcounter{secnumdepth}{x}` suppresses heading numbers of depth $> x$, where `chapter` has depth 0. Use a `*`, as in `\section*{title}`, to not number a particular item—these items will also not appear in the table of contents.

Text environments

`\begin{comment}` Comment (not printed). Requires `verbatim` package.
`\begin{quote}` Indented quotation block.
`\begin{quotation}` Like `quote` with indented paragraphs.
`\begin{verse}` Quotation block for verse.

Lists

`\begin{enumerate}` Numbered list.
`\begin{itemize}` Bulleted list.
`\begin{description}` Description list.
`\item text` Add an item.
`\item[x] text` Use x instead of normal bullet or number. Required for descriptions.

References

`\label{marker}` Set a marker for cross-reference, often of the form `\label{sec:item}`.
`\ref{marker}` Give section/body number of marker.
`\pageref{marker}` Give page number of marker.
`\footnote{text}` Print footnote at bottom of page.

Floating bodies

`\begin{table}[place]` Add numbered table.
`\begin{figure}[place]` Add numbered figure.
`\begin{equation}[place]` Add numbered equation.
`\caption{text}` Caption for the body.
The *place* is a list valid placements for the body. `t`=top, `h`=here, `b`=bottom, `p`=separate page, `!`=place even if ugly. Captions and label markers should be within the environment.

Text properties

Font face

| Command | Declaration | Effect |
|--------------------------------|-------------------------------|----------------------|
| <code>\textrm{text}</code> | <code>\rmfamily text</code> | Roman family |
| <code>\textsf{text}</code> | <code>\sffamily text</code> | Sans serif family |
| <code>\texttt{text}</code> | <code>\ttfamily text</code> | Typewriter family |
| <code>\textmd{text}</code> | <code>\mdseries text</code> | Medium series |
| <code>\textbf{text}</code> | <code>\bfseries text</code> | Bold series |
| <code>\textup{text}</code> | <code>\upshape text</code> | Upright shape |
| <code>\textit{text}</code> | <code>\itshape text</code> | <i>Italic shape</i> |
| <code>\textsl{text}</code> | <code>\slshape text</code> | <i>Slanted shape</i> |
| <code>\textsc{text}</code> | <code>\scshape text</code> | SMALL CAPS SHAPE |
| <code>\emph{text}</code> | <code>\em text</code> | <i>Emphasized</i> |
| <code>\textnormal{text}</code> | <code>\normalfont text</code> | Document font |
| <code>\underline{text}</code> | | <u>Underline</u> |

The command `(ttt)` form handles spacing better than the declaration `(ttt)` form.

Font size

| Font size | Declaration | Effect |
|----------------------------|---------------------------|----------------------|
| <code>\tiny</code> | <code>tiny</code> | <small>Large</small> |
| <code>\scriptsize</code> | <code>scriptsize</code> | <small>LARGE</small> |
| <code>\footnotesize</code> | <code>footnotesize</code> | <small>huge</small> |
| <code>\small</code> | <code>small</code> | <small>Huge</small> |
| <code>\normalsize</code> | <code>normalsize</code> | |
| <code>\large</code> | <code>large</code> | |

These are declarations and should be used in the form `\small ...`, or without braces to affect the entire document.

Verbatim text

`\begin{verbatim}` Verbatim environment.
`\begin{verbatim*}` Spaces are shown as `_`.
`\verb!text!` Text between the delimiting characters (in this case `‘!’`) is verbatim.

Justification

| Environment | Declaration |
|---------------------------------|---------------------------|
| <code>\begin{center}</code> | <code>\centering</code> |
| <code>\begin{flushleft}</code> | <code>\raggedright</code> |
| <code>\begin{flushright}</code> | <code>\raggedleft</code> |

Miscellaneous

`\linespread{x}` changes the line spacing by the multiplier x .

Text-mode symbols

Symbols

| | | | | | | | |
|--------------------|---------------------|----------------|---------------------|------------------|-----------------------|-----------------|-----------------------------|
| <code>&</code> | <code>\&</code> | <code>-</code> | <code>_</code> | <code>...</code> | <code>\ldots</code> | <code>•</code> | <code>\textbullet</code> |
| <code>\$</code> | <code>\\$</code> | <code>^</code> | <code>\^{}{}</code> | <code> </code> | <code>\textbar</code> | <code>\</code> | <code>\textbackslash</code> |
| <code>%</code> | <code>\%</code> | <code>~</code> | <code>\~{}{}</code> | <code>#</code> | <code>\#</code> | <code>\$</code> | <code>\\$</code> |

Accents

| | | | | | | | | | |
|----------------|-------------------|----------------|-------------------|----------------|-------------------|----------------|--------------------|----------------|-------------------|
| <code>ò</code> | <code>\‘o</code> | <code>ó</code> | <code>\’o</code> | <code>ô</code> | <code>\ˆo</code> | <code>õ</code> | <code>\~o</code> | <code>ö</code> | <code>\=o</code> |
| <code>ó</code> | <code>\.o</code> | <code>ö</code> | <code>\"o</code> | <code>q</code> | <code>\c o</code> | <code>ö</code> | <code>\v o</code> | <code>ö</code> | <code>\H o</code> |
| <code>ç</code> | <code>\c c</code> | <code>q</code> | <code>\d o</code> | <code>q</code> | <code>\b o</code> | <code>ö</code> | <code>\t oo</code> | <code>œ</code> | <code>\oe</code> |
| <code>Œ</code> | <code>\OE</code> | <code>æ</code> | <code>\ae</code> | <code>Æ</code> | <code>\AE</code> | <code>â</code> | <code>\aa</code> | <code>Å</code> | <code>\AA</code> |
| <code>ø</code> | <code>\o</code> | <code>Ø</code> | <code>\O</code> | <code>ı</code> | <code>\l</code> | <code>L</code> | <code>\L</code> | <code>ı</code> | <code>\i</code> |
| <code>j</code> | <code>\j</code> | <code>i</code> | <code>\~{}</code> | <code>ı</code> | <code>\?</code> | | | | |

Delimiters

| | | | | | | | | | | | |
|----------------|----------------|----------------|-----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-------------------|---------------------------|
| <code>‘</code> | <code>‘</code> | <code>“</code> | <code>‘‘</code> | <code>{</code> | <code>\{</code> | <code>[</code> | <code>[</code> | <code>(</code> | <code>(</code> | <code><</code> | <code>\textless</code> |
| <code>’</code> | <code>’</code> | <code>”</code> | <code>’’</code> | <code>}</code> | <code>\}</code> | <code>]</code> | <code>]</code> | <code>)</code> | <code>)</code> | <code>></code> | <code>\textgreater</code> |

Dashes

| Name | Source | Example | Usage |
|---------|--------|------------|------------------|
| hyphen | - | X-ray | In words. |
| en-dash | -- | 1–5 | Between numbers. |
| em-dash | --- | Yes—or no? | Punctuation. |

Line and page breaks

`\` Begin new line without new paragraph.
`*` Prohibit pagebreak after linebreak.
`\kill` Don't print current line.
`\pagebreak` Start new page.
`\noindent` Do not indent current line.

Miscellaneous

| | |
|--------------------------|--|
| <code>\today</code> | May 27, 2024. |
| <code>\$\sim\$</code> | Prints <code>~</code> instead of <code>\~{}</code> , which makes <code>~</code> . |
| <code>~</code> | Space, disallow linebreak (W.J. <code>~</code> Clinton). |
| <code>\@.</code> | Indicate that the <code>.</code> ends a sentence when following an uppercase letter. |
| <code>\hspace{l}</code> | Horizontal space of length l (Ex: $l = 20\text{pt}$). |
| <code>\vspace{l}</code> | Vertical space of length l . |
| <code>\rule{w}{h}</code> | Line of width w and height h . |

Tabular environments

tabbing environment

`\=` Set tab stop. `\>` Go to tab stop.

Tab stops can be set on “invisible” lines with `\kill` at the end of the line. Normally `\` is used to separate lines.

tabular environment

```
\begin{array}[pos]{cols}
\begin{tabular}[pos]{cols}
\begin{tabular*}{width}[pos]{cols}
```

tabular column specification

| | |
|-----------------------|---|
| <code>l</code> | Left-justified column. |
| <code>c</code> | Centered column. |
| <code>r</code> | Right-justified column. |
| <code>p{width}</code> | Same as <code>\parbox[t]{width}</code> . |
| <code>@{decl}</code> | Insert <i>decl</i> instead of inter-column space. |
| <code> </code> | Inserts a vertical line between columns. |

tabular elements

| | |
|--|---|
| <code>\hline</code> | Horizontal line between rows. |
| <code>\cline{x-y}</code> | Horizontal line across columns x through y . |
| <code>\multicolumn{n}{cols}{text}</code> | A cell that spans n columns, with <i>cols</i> column specification. |

Math mode

For inline math, use `\(...\)` or `$...$`. For displayed math, use `\[...\]` or `\begin{equation}`.

| | | | |
|-----------------|--------------------------|-----------------|----------------------------|
| Superscript x | <code>~{x}</code> | Subscript x | <code>_ {x}</code> |
| $\frac{x}{y}$ | <code>\frac{x}{y}</code> | $\sum_{k=1}^n$ | <code>\sum_{k=1}^n</code> |
| $\sqrt[n]{x}$ | <code>\sqrt[n]{x}</code> | $\prod_{k=1}^n$ | <code>\prod_{k=1}^n</code> |

Math-mode symbols

| | | | | | | | |
|------------|-----------------------|-----------|----------------------|-----------|----------------------|-------------------|------------------------------|
| \leq | <code>\leq</code> | \geq | <code>\geq</code> | \neq | <code>\neq</code> | \approx | <code>\approx</code> |
| \times | <code>\times</code> | \div | <code>\div</code> | \pm | <code>\pm</code> | \cdot | <code>\cdot</code> |
| \circ | <code>\circ</code> | \circ | <code>\circ</code> | \prime | <code>\prime</code> | \cdots | <code>\cdots</code> |
| ∞ | <code>\infty</code> | \neg | <code>\neg</code> | \wedge | <code>\wedge</code> | \vee | <code>\vee</code> |
| \supset | <code>\supset</code> | \forall | <code>\forall</code> | \in | <code>\in</code> | \rightarrow | <code>\rightarrow</code> |
| \subset | <code>\subset</code> | \exists | <code>\exists</code> | \notin | <code>\notin</code> | \Rightarrow | <code>\Rightarrow</code> |
| \cup | <code>\cup</code> | \cap | <code>\cap</code> | $ $ | <code> </code> | \Leftrightarrow | <code>\Leftrightarrow</code> |
| \dot{a} | <code>\dot{a}</code> | \hat{a} | <code>\hat{a}</code> | \bar{a} | <code>\bar{a}</code> | \tilde{a} | <code>\tilde{a}</code> |
| α | <code>\alpha</code> | β | <code>\beta</code> | γ | <code>\gamma</code> | δ | <code>\delta</code> |
| ϵ | <code>\epsilon</code> | ζ | <code>\zeta</code> | η | <code>\eta</code> | ε | <code>\varepsilon</code> |
| θ | <code>\theta</code> | ι | <code>\iota</code> | κ | <code>\kappa</code> | ϑ | <code>\vartheta</code> |
| λ | <code>\lambda</code> | μ | <code>\mu</code> | ν | <code>\nu</code> | ξ | <code>\xi</code> |
| π | <code>\pi</code> | ρ | <code>\rho</code> | σ | <code>\sigma</code> | τ | <code>\tau</code> |
| υ | <code>\upsilon</code> | ϕ | <code>\phi</code> | χ | <code>\chi</code> | ψ | <code>\psi</code> |
| ω | <code>\omega</code> | Γ | <code>\Gamma</code> | Δ | <code>\Delta</code> | Θ | <code>\Theta</code> |
| Λ | <code>\Lambda</code> | Ξ | <code>\Xi</code> | Π | <code>\Pi</code> | Σ | <code>\Sigma</code> |
| Υ | <code>\Upsilon</code> | Φ | <code>\Phi</code> | Ψ | <code>\Psi</code> | Ω | <code>\Omega</code> |

Bibliography and citations

When using `BIBTEX`, you need to run `latex`, `bibtex`, and `latex` twice more to resolve dependencies.

Citation types

| | |
|-------------------------------|--|
| <code>\cite{key}</code> | Full author list and year. (Watson and Crick 1953) |
| <code>\citeA{key}</code> | Full author list. (Watson and Crick) |
| <code>\citeN{key}</code> | Full author list and year. Watson and Crick (1953) |
| <code>\shortcite{key}</code> | Abbreviated author list and year. ? |
| <code>\shortciteA{key}</code> | Abbreviated author list. ? |
| <code>\shortciteN{key}</code> | Abbreviated author list and year. ? |
| <code>\citeyear{key}</code> | Cite year only. (1953) |

All the above have an NP variant without parentheses; Ex. `\citeNP`.

BIBTEX entry types

| | |
|----------------------------|--|
| <code>@article</code> | Journal or magazine article. |
| <code>@book</code> | Book with publisher. |
| <code>@booklet</code> | Book without publisher. |
| <code>@conference</code> | Article in conference proceedings. |
| <code>@inbook</code> | A part of a book and/or range of pages. |
| <code>@incollection</code> | A part of book with its own title. |
| <code>@misc</code> | If nothing else fits. |
| <code>@phdthesis</code> | PhD. thesis. |
| <code>@proceedings</code> | Proceedings of a conference. |
| <code>@techreport</code> | Tech report, usually numbered in series. |
| <code>@unpublished</code> | Unpublished. |

BIBTEX fields

| | |
|---------------------------|---|
| <code>address</code> | Address of publisher. Not necessary for major publishers. |
| <code>author</code> | Names of authors, of format |
| <code>booktitle</code> | Title of book when part of it is cited. |
| <code>chapter</code> | Chapter or section number. |
| <code>edition</code> | Edition of a book. |
| <code>editor</code> | Names of editors. |
| <code>institution</code> | Sponsoring institution of tech. report. |
| <code>journal</code> | Journal name. |
| <code>key</code> | Used for cross ref. when no author. |
| <code>month</code> | Month published. Use 3-letter abbreviation. |
| <code>note</code> | Any additional information. |
| <code>number</code> | Number of journal or magazine. |
| <code>organization</code> | Organization that sponsors a conference. |
| <code>pages</code> | Page range (2,6,9--12). |
| <code>publisher</code> | Publisher’s name. |
| <code>school</code> | Name of school (for thesis). |
| <code>series</code> | Name of series of books. |
| <code>title</code> | Title of work. |
| <code>type</code> | Type of tech. report, ex. “Research Note”. |
| <code>volume</code> | Volume of a journal or book. |
| <code>year</code> | Year of publication. |

Not all fields need to be filled. See example below.

Common BIBTEX style files

| | | | |
|--------------------|----------|-----------------------|----------------------------------|
| <code>abbrv</code> | Standard | <code>abstract</code> | <code>alpha</code> with abstract |
| <code>alpha</code> | Standard | <code>apa</code> | APA |
| <code>plain</code> | Standard | <code>unsrt</code> | Unsorted |

The `LATEX` document should have the following two lines just before `\end{document}`, where `bibfile.bib` is the name of the `BIBTEX` file.

```
\bibliographystyle{plain}
\bibliography{bibfile}
```

BIBTEX example

The `BIBTEX` database goes in a file called *file.bib*, which is processed with `bibtex` file.

```
@String{N = {Na\~{t}ure}}
@Article{WC:1953,
  author = {James Watson and Francis Crick},
  title = {A structure for Deoxyribose Nucleic Acid},
  journal = N,
  volume = {171},
  pages = {737},
  year = 1953
}
```

Sample L^AT_EX document

```
\documentclass[11pt]{article}
\usepackage{fullpage}
\title{Template}
\author{Name}
\begin{document}
```

```
\maketitle
```

```
\section{section}
```

```
\subsection*{subsection without number}
```

```
text \textbf{bold text} text. Some math:  $2+2=5$ 
```

```
\subsection{subsection}
```

```
text \emph{emphasized text} text. \cite{WC:1953}
```

```
discovered the structure of DNA.
```

```
A table:
```

```
\begin{table}[!th]
```

```
\begin{tabular}{|l|c|r|}
```

```
\hline
```

```
first & row & data \\
```

```
second & row & data \\
```

```
\hline
```

```
\end{tabular}
```

```
\caption{This is the caption}
```

```
\label{ex:table}
```

```
\end{table}
```

```
The table is numbered \ref{ex:table}.
```

```
\end{document}
```

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<http://wch.github.io/latexsheet/>