# 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 LaTeX symbol font.
`graphicx` Show image: `\includegraphics[width=`*x*`]{`*file*`}`.
`url` Insert URL: `\url{`*http://...*`}`.

Use before `\begin{document}`. 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* |
|---|---|---|
| `\textrm{`*text*`}` | `{\rmfamily` *text*`}` | Roman family |
| `\textsf{`*text*`}` | `{\sffamily` *text*`}` | Sans serif family |
| `\texttt{`*text*`}` | `{\ttfamily` *text*`}` | `Typewriter family` |
| `\textmd{`*text*`}` | `{\mdseries` *text*`}` | Medium series |
| `\textbf{`*text*`}` | `{\bfseries` *text*`}` | **Bold series** |
| `\textup{`*text*`}` | `{\upshape` *text*`}` | Upright shape |
| `\textit{`*text*`}` | `{\itshape` *text*`}` | *Italic shape* |
| `\textsl{`*text*`}` | `{\slshape` *text*`}` | *Slanted shape* |
| `\textsc{`*text*`}` | `{\scshape` *text*`}` | Small Caps shape |
| `\emph{`*text*`}` | `{\em` *text*`}` | *Emphasized* |
| `\textnormal{`*text*`}` | `{\normalfont` *text*`}` | Document font |
| `\underline{`*text*`}` | | Underline |

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

### Font size

`\tiny` tiny
`\scriptsize` scriptsize
`\footnotesize` footnotesize
`\small` small
`\normalsize` normalsize
`\large` large
`\Large` Large
`\LARGE` LARGE
`\huge` huge
`\Huge` Huge

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* |
|---|---|
| `\begin{center}` | `\centering` |
| `\begin{flushleft}` | `\raggedright` |
| `\begin{flushright}` | `\raggedleft` |

### Miscellaneous

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

## Text-mode symbols

### Symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| & | `\&` | _ | `\_` | ... | `\ldots` | • | `\textbullet` |
| $ | `\$` | ^ | `\^{}` | \| | `\textbar` | \ | `\textbackslash` |
| % | `\%` | ~ | `\~{}` | # | `\#` | § | `\S` |

### Accents

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ò | `\‘o` | ó | `\’o` | ô | `\^o` | õ | `\~o` | ō | `\=o` |
| ȯ | `\.o` | ö | `\"o` | o̧ | `\c o` | ŏ | `\v o` | ő | `\H o` |
| ç | `\c c` | o̩ | `\d o` | o̲ | `\b o` | o͡o | `\t oo` | œ | `\oe` |
| Œ | `\OE` | æ | `\ae` | Æ | `\AE` | å | `\aa` | Å | `\AA` |
| ø | `\o` | Ø | `\O` | ł | `\l` | Ł | `\L` | ı | `\i` |
| ȷ | `\j` | ¡ | `~‘` | ¿ | `?‘` | | | | |

### Delimiters

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

### 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

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

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

### `tabular` elements

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

## Math mode

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

| | | | |
|---|---|---|---|
| Superscript $x^x$ | `^{x}` | Subscript $_x$ | `_{x}` |
| $\frac{x}{y}$ | `\frac{x}{y}` | $\sum_{k=1}^{n}$ | `\sum_{k=1}^n` |
| $\sqrt[n]{x}$ | `\sqrt[n]{x}` | $\prod_{k=1}^{n}$ | `\prod_{k=1}^n` |

### Math-mode symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\leq$ | `\leq` | $\geq$ | `\geq` | $\neq$ | `\neq` | $\approx$ | `\approx` |
| $\times$ | `\times` | $\div$ | `\div` | $\pm$ | `\pm` | $\cdot$ | `\cdot` |
| $\circ$ | `^{\circ}` | $\circ$ | `\circ` | $\prime$ | `\prime` | $\cdots$ | `\cdots` |
| $\infty$ | `\infty` | $\neg$ | `\neg` | $\wedge$ | `\wedge` | $\vee$ | `\vee` |
| $\supset$ | `\supset` | $\forall$ | `\forall` | $\in$ | `\in` | $\rightarrow$ | `\rightarrow` |
| $\subset$ | `\subset` | $\exists$ | `\exists` | $\notin$ | `\notin` | $\Rightarrow$ | `\Rightarrow` |
| $\cup$ | `\cup` | $\cap$ | `\cap` | $\mid$ | `\mid` | $\Leftrightarrow$ | `\Leftrightarrow` |
| $\dot{a}$ | `\dot a` | $\hat{a}$ | `\hat a` | $\bar{a}$ | `\bar a` | $\tilde{a}$ | `\tilde a` |
| $\alpha$ | `\alpha` | $\beta$ | `\beta` | $\gamma$ | `\gamma` | $\delta$ | `\delta` |
| $\epsilon$ | `\epsilon` | $\zeta$ | `\zeta` | $\eta$ | `\eta` | $\varepsilon$ | `\varepsilon` |
| $\theta$ | `\theta` | $\iota$ | `\iota` | $\kappa$ | `\kappa` | $\vartheta$ | `\vartheta` |
| $\lambda$ | `\lambda` | $\mu$ | `\mu` | $\nu$ | `\nu` | $\xi$ | `\xi` |
| $\pi$ | `\pi` | $\rho$ | `\rho` | $\sigma$ | `\sigma` | $\tau$ | `\tau` |
| $\upsilon$ | `\upsilon` | $\phi$ | `\phi` | $\chi$ | `\chi` | $\psi$ | `\psi` |
| $\omega$ | `\omega` | $\Gamma$ | `\Gamma` | $\Delta$ | `\Delta` | $\Theta$ | `\Theta` |
| $\Lambda$ | `\Lambda` | $\Xi$ | `\Xi` | $\Pi$ | `\Pi` | $\Sigma$ | `\Sigma` |
| $\Upsilon$ | `\Upsilon` | $\Phi$ | `\Phi` | $\Psi$ | `\Psi` | $\Omega$ | `\Omega` |

## Bibliography and citations

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

### Citation types

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

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

### BibTeX entry types

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

### BibTeX fields

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

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

### Common BibTeX style files

| | | | |
|---|---|---|---|
| `abbrv` | Standard | `abstract` | `alpha` with abstract |
| `alpha` | Standard | `apa` | APA |
| `plain` | Standard | `unsrt` | 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\-ture}}
@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 LaTeX 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}
```