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Session 8 Recap

CELEN087

Learning outcomes:

- Know two standard packages used for typesetting math
- Know different environments for typesetting math contents
- Choose suitable environments depending on the content structure
- Align multiple lines of equations based on the actual need in your article
- Get familar with LaTeX commands for commonly used math symbols/notations

Content Summary

1. **Math environments**

   (a) inline math

   `$...$` or `\(...\)`

   (b) display math

   `$$...$$` or `\[...\]`

   (c) equation environment

   ```
   \begin{equation}
   ...
   \end{equation}
   ```

   (d) eqnarray environment

   ```
   \begin{eqnarray}
   ... &=& ...\\
   ... &=& ...
   \end{eqnarray}
   ```

   (e) align environment

   ```
   \begin{align}
   ... &= ...\\
   ... &= ...
   \end{align}
   ```

   Important note:

   - (a)(b)(c): for typesetting simple/single-line math content
   - (d)(e): for typesetting multiple-line math equations and aligning them at specified places (for example, here the alignment is at the equal sign)
   - (c)(d)(e): can automatically add the equation number. To suppress a specific equation number, use command `\nonumber` in that line; to suppress all equation numbers, use * in the environment (for example, `\begin{equation*}...\end{equation*}`.
   - (e): can align multiple lines at multiple places (refer to self-study links)

2. **Matrix/Array structures**

   (a) matrix in parentheses ( )

   ```
   \begin{pmatrix} % using a 2-by-4 matrix example
   ...&...&...&...\\
   ...&...&...&...
   \end{pmatrix}
   ```

   (b) matrix in brackets [ ]

   ```
   \begin{bmatrix} % using a 2-by-4 matrix example
   ...&...&...&...\\
   ...&...&...&...
   \end{bmatrix}
   ```

   (c) matrix in vertical lines — — (determinant of a matrix)

   ```
   \begin{vmatrix} % using a 2-by-4 matrix example
   ...&...&...&...\\
   ...&...&...&...
   \end{vmatrix}
   ```

   (d) matrix using array environment

   ```
   \left( % specify bracket pairs: \left(, \left[, \left|, \left\{
   \begin{array}{cccc} % specify column alignments: c, l, r
   ...&...&...&...\\
   ...&...&...&...
   \end{array}
   \right) % specify bracket pairs: \right(, \right[, \right|, \right\{
   ```

   Important note:

   - (a)(b)(c)(d): all must be included into one of the math environments summarized above
   - (a)(b)(c): can typeset matrix with center-aligned columns
   - (d): can customize the matrix (types of brackets, column alignments) with more flexibilities
   - (d): can also typeset one-side bracket.

     For example, `\left\{CONTENT\right.` `\left. CONTENT\right]`

3. **LaTeX packages used in this module**

   To declare the use of a package, include the following command in the preamble with package names:

   ```
   \usepackage{packageName}
   ```

   - amsmath % for typesetting math
   - amssymb % for typesetting math
   - graphicx % for inserting image
   - geometry % for adjusting page