LaTeX Seminar Week 2
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Document classes, basic math formatting, basic pictures, tables and matrices

Document Classes

- Used \documentclass before, here are more options:
  - \documentclass{ *insert_class_here* }
    - article, IEEEtran, report, letter
- Specify some formatting in your document:
  - \documentclass[*options*]{ *class* }
    - 10pt, 11pt, 12pt, letterpaper, a4paper, legalpaper, landscape
    - titlepage (new page after title), notitlepage
    - onecolumn, twocolumn
    - draft
- \documentclass[12pt, letterpaper, twocolumn]{article}

Preamble

- Any extra commands that specify how the document should be displayed
- Packages combine many useful commands
  - Importing pictures, display complex math symbols, document layout
- To use a particular package, invoke
  - \usepackage{ *package_name* }
- \usepackage{graphics}

Formatting Mathematics

- The basic LaTeX math environment
  - Inline – embed mathematics into paragraph text
  - \begin{math} … \end{math}
    - Abbreviated in LaTeX as \(… \)
    - Abbreviated in TeX as $ … $
- In math mode, spaces separate variables
  - \(a^2 + b^2 = c^2 \)
  - Each adjacent set of characters is treated as a variable
- See References for extensive list of supported symbols

Formatting Mathematics Continued

- Exponents and subscripts are designated by ^*exponent* and _*subscript*, respectively
  - To insert an expression, use ^{ … } or _{ … }
- Trig functions are \sin, \cos, \tan, \arcsin …
- Greek letters are given by *letter_name*
  - i.e. \alpha, \beta, \gamma, \delta, …
  - Capitals are \Alpha, \Beta, \Gamma, \Delta, …
- Prime notation uses single quote (’)

Formatting Mathematics Continued

- Fractions are designated by \frac{numerator}{denominator}
- Roots are specified by \sqrt[*n*]{ *argument* }
  - *n* defaults to a blank, making a square root
- Integrals are specified by \int
  - Definite integrals take a subscript and superscript
- Examples: f'(x), F = G \frac{ m_1 m_2 }{ r^2 }, \int_{0}^{\pi}\frac{84}{\pi}\cos^2(x) dx

Importing Pictures

- LaTeX requires an external helper package to display pictures (i.e. \usepackage{graphics})
- The standard package accepts only postscript-type pictures
  - *.eps *.ps *.ps.gz
- GIMP can save pictures in postscript format.
- To embed a picture, invoke
  - \includegraphics{ *filename.eps* }

Importing Pictures Continued

- Pictures are external elements
  - LaTeX makes space in the document and pastes the picture in after aligning the text
- Postscript pictures have printing dimensions in the file, which is how LaTeX can make sufficient space
  - The pictures are not cropped, so they can sometimes go beyond the page or overlap text if in two column format
- To crop the picture to specific dimensions, use
  - \includegraphics*[llx, lly][urx, ury]{ *filename.eps* }

Importing Pictures Continued

- For cropped pictures, [llx, lly] refers to the coordinates of the lower-left corner of the picture (default [0,0])
  - Upper-right coordinates are [urx, ury]
  - Use units with the coordinates (pt, in, cm)
    - 72.27 pt = 1 in, 28.35 pt = 1 cm
  - Get in the habit of including both coordinates, even if the first is [0,0]

- Crop unnecessary white space around pictures using the coordinates (or add some)

Tables & Matrices

- Tables and Matrices use similar syntax to delineate between elements
  - Main difference: tables require the number of columns and alignment to be specified; matrices are implicitly specified

- Tables start with
  - \begin{tabular}{ *column_specification* }
  - Each column is aligned left, center, right, or specified as a paragraph
  - Respectively, these alignments are: l, c, r, p
  - Columns *may* be separated by vertical lines (| or ||)

Tables & Matrices Continued

- Elements are separated by **&** ; rows are ended with ****
- To make a row span multiple columns, use
  - \multicolumn{ *number_of_columns* }{ *alignment* }{ *element* }
- Draw horizontal lines using
  - \hline
- Example table:
  - \begin{tabular}{ l | c || r }
    \hline \\
    \multicolumn{3}{ |c| }{Example Title} \\
    \hline \\
    a & b & c
    \hline
  - \end{tabular}

Tables & Matrices Continued

- Matrices use the dimension of their first row to specify the number of columns

- \begin{matrix}
  1 & 2 & 3 \\
  4 & 5 & 6 \\
  \end{matrix}

- Parenthesis or brackets may be specified by
  - \left(… \right) or \left[… \right]

Tables & Matrices Continued

- Matrices come with some special types which display the delimiters automatically

- pmatrix – ( )
  bmatrix – [ ]
  Bmatrix – { }
  vmatrix – | |
  Vmatrix – || ||

- By default, all columns are centered

References

- Wikibooks:
  - en.wikibooks.org/wiki/LaTeX
- Frequently used symbols:
  - amath.colorado.edu/documentation/LaTeX/Symbols.pdf
- Comprehensive symbol list:
  - www.ctan.org/tex-archive/info/symbols/comprehensive