ENG 004 Lecture 20, Dec 6, 2012

Announcements

- Homework #8 due now
- Final Exam: Friday December 14, 8 AM - 10 AM
  - Last Name A-L: Wellman 6
  - Last Name M-Z: Wellman 216

Topics

- Plotting
- Review
- Evaluations

Plotting with Matplotlib

Matplotlib website

Matplotlib gallery

Example plot done in class

Other example plots

XKCD Comic

XKCDify your plots

Tips for good figures

- Make sure to size your figures to the same size as you want them printed. If you make a high resolution export that is a very large size, you can potentially resize it to make it fit in your paper. But remember that the resize will change all of the font sizes. In word processors like MS word and Open Office it is very tempting to drag resize your images so they fit. Do not do this! You will always distort the image.
- Make use of vector graphics based formats for clean resizing, multi-use, small file sizes.
- In Matlab and matplotlib resize your plots, set font sizes and line widths, use Latex commands for symbols, text and equations. I typically export as pdf or eps for easy inserting into pdf latex documents. Here is one example of some things to improve your plotting in Matlab.
- The golden ratio makes for good width to height ratios.
- If you have to use bitmap (jpg, png, bmp, gif) images use at least 300 dpi, especially for photographs.

Tips for good figures

- Color is great but many journals still print in greyscale as a default. Make sure you adapt adjust the greyscale yourself so that for photographs. Make use of different line types and line markers in plots. Sometimes greyscale lines are tough to see.
- Don't forget axis labels, tick marks, units, etc. These details are very important!
- Make sure subplots are aligned properly with each other. This includes the tick marks.
- Make sure your graph fonts match the fonts in the paper text. Size the fonts accordingly, 8-10pt font is about as small as you should make text on a paper for readability. Remember that some people may not be able to see as well as you.

Tips for good figures

- Use embedded Latex for your equations and greek symbols. Matlab, matplotlib and many other programs have this ability. MS Word and other word processors generally do a horrible job at typesetting mathematics. Avoid them if at all possible.
- Experiment with more artistic ways of drawing your figures, don't be stuck withing the boundaries of engineering graphics.
- Plots from spreadsheet programs like Excel are not publication quality. They typically look pretty bad.
- Use scanned hand drawn images, photos or outputs from CAD as a background to trace vector graphics over, then delete the background. Helps give realistic three dimensional shapes.

Final Exam

- 2 hours
- Closed book, close notes, no electronic devices
- All paper will be provided
- Can be completed without drawing tools, but they will help
- Comprehensive but more focused on material since midterm
- Questions will attempt to test understanding more than memorization

Review: Design

- Design models: concurrent and linear, ETC/ARC
- Ram's Principles
- Design Thinking
- Visual Thinking
- Role of graphics in design: visualization, documentation, communication

Review: Projection Theory

- Projection Types: multiview, axonometric, oblique, perspective
- Perspective: one point, two point, and three point
- Parallel projections: multiview, isometric, oblique
- First angle, third angle projections

Review: Sketching

- Grids
- Coordinates
- Iso to multiview
- Multiview to iso
- Section Views
- Auxiliary Views

Review: Solid Model Construction

- 2D and 3D Primitives
- Work points, axes, planes
- Constructive modeling and boolean operations
- Feature planning
- 2D and 3D constraints and parametric constraints

Review: Working Drawings

- Title blocks, standards, symbols
- Dimensioning
- Traditional Tolerancing
- Fits
- Geometric Dimensioning and Tolerancing