Where are we
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Working with graphs
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Working with tables
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Advanced Research Tools for Economics and Business Administration (Part II)

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Previous tutorial

Still somewhat more theoretical (why do you want to learn new tools)

- Importance of writing things down (reproducability)
- Text files are the bomb:
  - scriptable
  - input and output in/for other applications
- pros and cons of LaTeX
- Why bother with learning LaTeX?
  - for dead threes (aka paper)
  - html (cloud) uses LaTeX syntax as well for formula's and graph annotation

A quick recap

- Specific LaTeX commands starts with an \
  - \LaTeX
- Inline equations are within $ $
  - $\frac{a}{b}$ is the fraction between a and b
- There are a number of symbols that you cannot immediately use:
  - \, $, &, %, { and } are the most important (solution: start with an \)
- Environments start and end

```
\begin{equation}
a^2 + b^2 = c^2
\end{equation}
```

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Introduction

General structure

```
\documentclass[twocolumn, a4paper]{article}

% Preamble: how should it look like
\usepackage{multicol, lipsum}
\usepackage[english, german]{babel}

\begin{document}
    % Body: the real contents
    \lipsum
\end{document}
```

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Introduction

This tutorial

More practical, play around with LaTeX. In specific:

- packages, classes, etc. (make things look better)
- figures (usually import them, but sometimes make them yourself)
- tables
- automating tables with statistical output
- slides (just copy & paste from `.tex` document)

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Introduction

More information

- Look at these slides (.tex file provided)

- Look at the background material (Shiny paper both in .pdf and .tex file)

- Use templates: `http://www.latextemplates.com/`

- Problems? Google it:
  `http://tex.stackexchange.com/questions`

Packages, packages, and packages

The use of packages

- Typically, packages are used to change appearance
- To ensure no errors, usually opt for the full installation or have access to internet
- There are lots of them, see CTAN
- Often used packages
  - amsmath, graphicx, subfig, marvosym, microtype, booktabs, lipsum, pdflscape, fullpage
- format:

```
\usepackage[colorlinks=true,citecolor=magenta,
        urlcolor=magenta]{hyperref}
```

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Classes

The use of classes

- Typically one uses the `article` class
- However, there is as well a `book`, `mininal`, `report`, `beamer` class etcetera
- Specific user written classes are `memoir` and `elsarticle` classes
- Classes come with options such as

```
\documentclass[12pt, a4paper]{article}
```

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Bibliography

Bibliopgraphy

Default format is `BibTeX` - customizable (however limited) - defaults is good

If you want to customize quite a lot: `biblatex-biber` combination - usage

```
\usepackage[backend=biber]{biblatex}
```

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Bibliography

or go nuts

```
\usepackage[style= authoryear-icomp,
            backend=bibtex,
            natbib=true,
            firstinits=true,
            uniquename=true,
            backref=false,
            doi=false,
            isbn=false,
            url=false,
            maxnames=2,
            maxbibnames=10,
            dashed =true,
            backend=biber]
            {biblatex}
```

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Working with graphs

Import them

Figures/graphs and tables in a floating environment

```
\begin{figure}[h!]
    \center
        \includegraphics{ligatures_latex}
    \caption{...}
    \label{ligatures}
\end{figure}
```
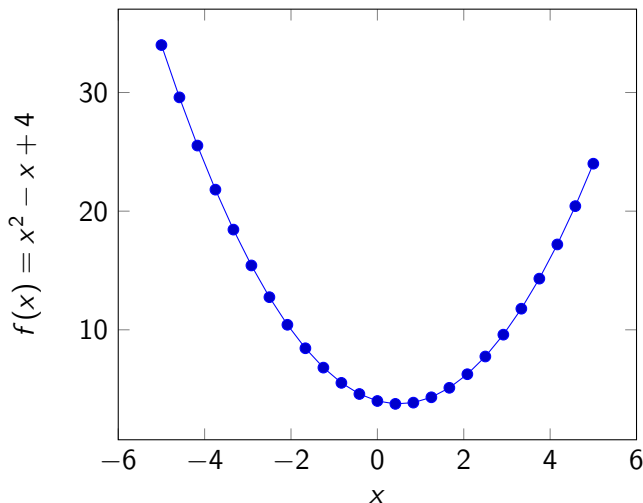
- \ref{ligatures} gives you now the correct internal reference
- How to make pictures then:
    - In the statistical environment you are working in
    - plotly

Making them yourself in LATEX (advanced)

PGF/TikZ combination for producing vector graphics

```
\usepackage{tikz, pgfplots}
\begin{tikzpicture}
    \begin{axis}[
        xlabel=$x$,
        ylabel={$f(x) = x^2 - x +4$}
    ]
    % use TeX as calculator:
    \addplot {x^2 - x +4};
    \end{axis}
\end{tikzpicture}
```

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Working with graphs

Which results in

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Table and stuff

Some guidelines

- No vertical lines!
- small spaces are usually better than horizontal lines
- Booktabs is a nice package

```
\toprule
\midrule
\addlinespace
\bottomrule
```

- Only include stuff that is important

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Table and stuff

Standard tables

```
\begin{table}[h!]
        \caption{Brilliant table}
        \label{tab:briltable}
        \begin{tabular}{cc}
                Row 1 & 100 \\
                Row 2 & 200
        \end{tabular}
\end{table}[h!]
```

Table 1: Brilliant table

Row 1	100
Row 2	200

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Table and stuff

This does not look nice!

```
\begin{table}[htbp]\centering
\def\sym#1{\ifmmode^{#1}\else\(^{#1}\)\fi}
\caption{Dep = Milles per Gallon}
\begin{tabular}{l*{2}{D{.}{.}{-1}}}
\toprule
                    &\multicolumn{1}{c}{(1)}&\multicolumn{1}{c}{(2)}\\
                    &\multicolumn{1}{c}{Mileage (mpg)}&\multicolumn{1}{c}{Mileage (mpg)}\\
\midrule
Car type            &     -1.6500  &     -2.2035* \\
                    &    (1.0760)  &    (1.0592)  \\
Weight (lbs.)       &     -0.0066**&     -0.0166**\\
                    &    (0.0006)  &    (0.0040)  \\
weight\_sqr         &            &      0.0000* \\
                    &            &    (0.0000)  \\
Constant            &    41.6797**&     56.5388**\\
                    &    (2.1655)  &    (6.1974)  \\
\midrule
Observations        &         74 &         74 \\
\(R^{2}\)           &      0.663  &      0.691  \\
F                   &    69.7485  &    52.2515  \\
\bottomrule
\multicolumn{3}{l}{\footnotesize Standard errors in parentheses}\\
\multicolumn{3}{l}{\footnotesize + \(p<0.1\), * \(p<0.05\), ** \(p<0.01\)}\\
\end{tabular}
\end{table}
```

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Table and stuff

So import stuff (stata do-file example) !

```
sysuse auto                          # load car data set
regress mpg foreign weight           # first regression
eststo linear                        # store first regression
gen weight_sqr = weight*weight       # Quadratic term
regress mpg foreign weight weight_sqr  # 2nd regression
eststo quadratic                     # store second regression
esttab linear quadratic ///          # write to output file
    using "${outputfiles}Results.tex", ///
    star(+ 0.1 * 0.05 ** 0.01) replace b(%9.4f) ///
    se r2 scalars("F") label keep ($covariates) ///
    title("Dep = Miles per Gallon") ///
    booktabs alignment(D{.}{.}{-1}) nogaps
```

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Table and stuff

With output

Table 2: Dep $=$ Miles per Gallon

	(1) Mileage (mpg)	(2) Mileage (mpg)
Car type	-1.6500	$-2.2035*$
	(1.0760)	(1.0592)
Weight (lbs.)	$-0.0066 * *$	$-0.0166 * *$
	(0.0006)	(0.0040)
weight_sqr		$0.0000*$
		(0.0000)
Constant	$41.6797 * *$	$56.5388 * *$
	(2.1655)	(6.1974)
Observations	74	74
R^2	0.663	0.691
F	69.7485	52.2515

Standard errors in parentheses
$+ \; p < 0.1$, * $p < 0.05$, ** $p < 0.01$

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Using beamer

Pros and cons

- Cons:
    - Not as quick out of the box as PowerPoint (powerphluff)
    - Typically beamer package which makes all things look alike
        - Enforces some things (e.g., limited space for tables)
- Pros:
    - Once created, similar on all versions/operating machines
    - You need to spend more time thinking
    - Better .pdf handling
    - Reuse of equations or code in general
    - There is a kind of a philosophy behind it

The Cognitive Style of PowerPoint (Edward Tufte)

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Using beamer

Using beamer package

```
\documentclass{beamer}              % new document class
    \usetheme{Darmstadt}                % new lay-out
    \usecolortheme{beaver}           % new color scheme
    \begin{document}              % begin document again
      % usually frames start with begin/end , except
    \frame{\titlepage}
        % Use section and subsection for slide menu
    \section{Where are we}\label{where-are-we}
                            % Frame and frame title
    \begin{frame}{Previous tutorial}
        Still somewhat more theoretical ...
        $a^2 + b^2 = c^2$           % formula if you want
    \end{frame}
    \end{document}                % always end a document
```

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Using beamer

In conclusion

- This tutorial is more a showcase
- Pick out the stuff you appreciate most
  - there is solution for almost everything
  - but it requires time investment
  - which only later will pay-off
- As things now develop there will be
  - more ephasis on internet/blogging publishing (slightly more advance than Facebook but on the same par as Wordpress)
    - including data and figures (dynamic infographics)
    - minor role for LaTeX
  - For dead trees: LaTeX is still the best when editing/writing complex documents