

Research Practice & Ethics

COMP9011

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Delivered To

MSc Software Architecture and Design

MSc Artificial Intelligence

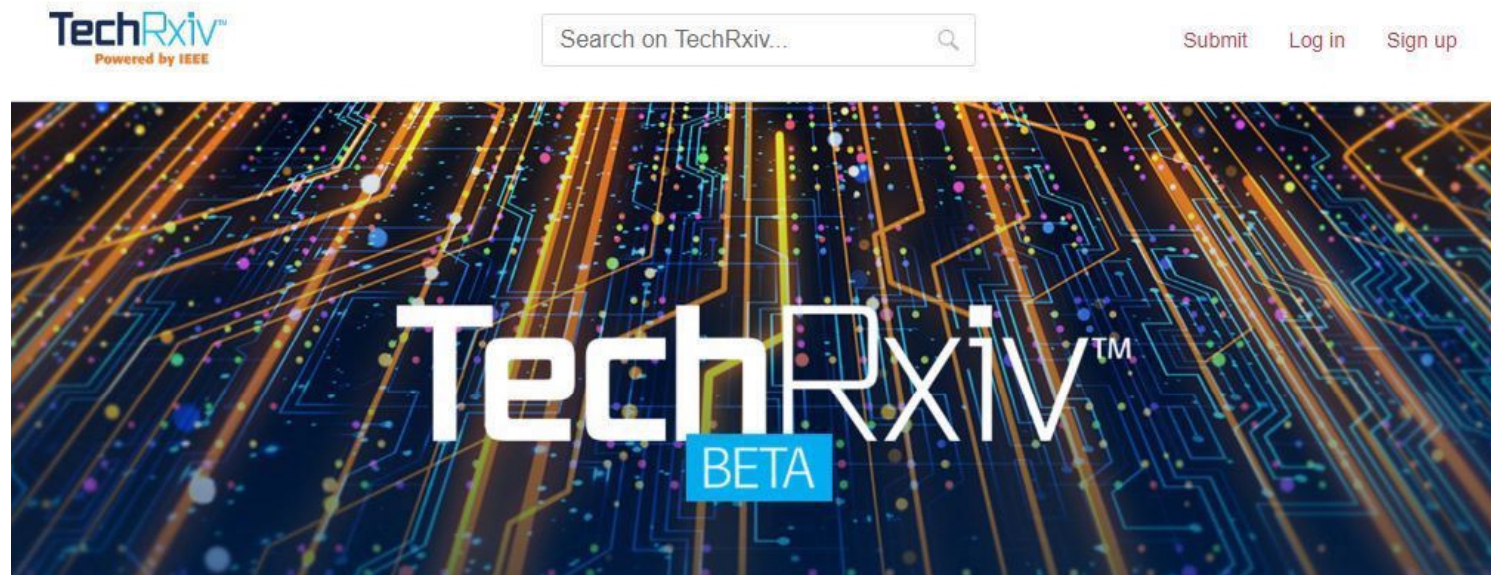
MSc Information Design and Development

Week 5

- **Archives**
- **IEEE ComSoC Best Readings**
 - **For Idea Generation**
- **IEEE Technology Trends 2020 (ComSoc & CS)**
- **IEEE Tools/Platforms**
- **LaTeX**

- Consider the rise of preprint usage and the repositories available today for math and physics (arXiv), for biology (bioRxiv), for chemistry (ChemRxiv) and for social sciences (SocArXiv), to name a few.
- ArXiv
- <https://arxiv.org/>
- SocArXiv
- <https://osf.io/preprints/socarxiv>

- In October 2019, the IEEE launched TechRxiv, an open, moderated preprint server for unpublished research in IEEE's technical fields of interest.
- This new repository supports authors and researchers in archiving their unpublished work before any formal peer review.
- The launch of TechRxiv is a strategic move on IEEE's part to help IEEE maintain its competitiveness in today's evolving publishing landscape.
- <https://www.techrxiv.org/>
- For IEEE, TechRxiv provides a new path to increase both submissions to IEEE journals and IEEE Xplore usage.



- For researchers, TechRxiv is a place where they can stake a claim to early research findings, quickly disseminate their work to a wide audience, and gain community feedback on preliminary versions of their research before considering submission to a conference or journal.

- <https://www.biorxiv.org/>



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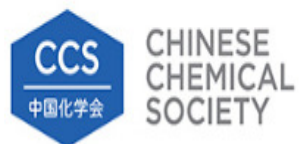
bioRxiv

THE PREPRINT SERVER FOR BIOLOGY



[Advanced Search](#)

- <https://chemrxiv.org/>



ChemRxivTM

ChemRxiv: The Preprint Server for Chemistry **ChemRxiv**



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- Source: <https://www.comsoc.org/publications/best-readings>
- Best Readings is a collection of books, articles, and papers on a featured topic.
- **Backhaul and Fronthaul: Communications, Networking, and Signal Processing**
This Best Readings list is expected to provide several archival papers and special issues on the backhaul/fronthaul and related networking, communication, and signal processing issues that are currently available.
- **Broadband Access**
The subject of broadband access covers a surprisingly wide range of technologies, and spans several decades of intensive research by groups from all over the world.

- **Cloud Communications and Networking**

Cloud computing is an innovative technology that relies on sharing of resources similar to a utility over the Internet.

- **Cognitive Radio**

This Best Readings is on Cognitive Radio (CR) Communications and Networking.

- **Communications and Information Systems Security**

This Best Readings is on Communications and Information Systems Security (CIS).

- **e-Health**

This Best Readings is on e-Health.

- **Device-to-Device Communications**

Device-to-device (D2D) communication has been foreseen as a key complimentary emerging technology within the 5G mobile communication paradigm, providing potential use cases such as peer-to-peer communication (e.g. for public safety, vehicle-to-everything (V2X), etc.), cellular offloading, device-based relaying, joint reception/transmission, content sharing, proximity detection, and other proximity-related services.

- **Green Communications**

This Best Readings is on Green Communications.

- **Internet of Things**

The Internet of Things started as the basis of providing identification and connectivity to any entity that could be relevant into a process, action or provide relevant data that could be used by other entities.

- **Machine Learning in Communications**

This collection of Best Readings focuses on ML in the physical and medium access control (MAC) layer of communication networks.

- **Massive MIMO**

While massive MIMO is still in its early stages of development, it is such a radical departure for current technologies that it stands to revolutionize the way that future cellular networks are designed, standardized, and implemented.

- **Multi-Tier Cellular**

This Best Readings is on Multi-Tier Cellular.

- **Nanoscale Communication Networks**

Nanoscale communication networks are more precisely distinguished from today's macroscale communication systems by the IEEE 1906.1 standard as communication systems having essential elements with at least one dimension on the order of hundreds of nanometers and that utilize a unique physical principal of operation.

- **Optical Wireless Communications**

This Best Readings section presents papers on optical wireless communications that cover several fronts, including information theoretic aspects, communication theoretic aspects, and implementation aspects.

- **Physical-Layer Security**

In this Best Readings, we highlight overview articles, archival technical papers, as well as special issues on physical-layer security that are representative of physical-layer security today.

- **Polar Coding**

In this Best Readings, we summarize several papers on the theoretical foundations of polarization theory, the construction and decoding of practical polar codes, as well as some generalized polar codes, which can help to overcome limitations of classical Arıkan polar codes.

- **Power Line Communications**

The topic of PLCs is difficult as it lies at the intersection of several fields: circuit analysis, transmission line theory, electromagnetic theory, signal processing, and communications and information theory.

- **Smart Grid Communications**

This Best Readings is a concise list of must-read books and articles that reveal the role and the potential of communication networks and systems in the smart grid.

- **UAV Assisted Wireless Networks**

In this Best Readings, we introduce several books, archival papers and special issues on the topic of UAV assisted communication and sensing applications over cellular networks.

Nine Communications Technology Trends for 2020

IEEE Communications Society



Source: <https://www.comsoc.org/publications/ctn/nine-communications-technology-trends-2020>

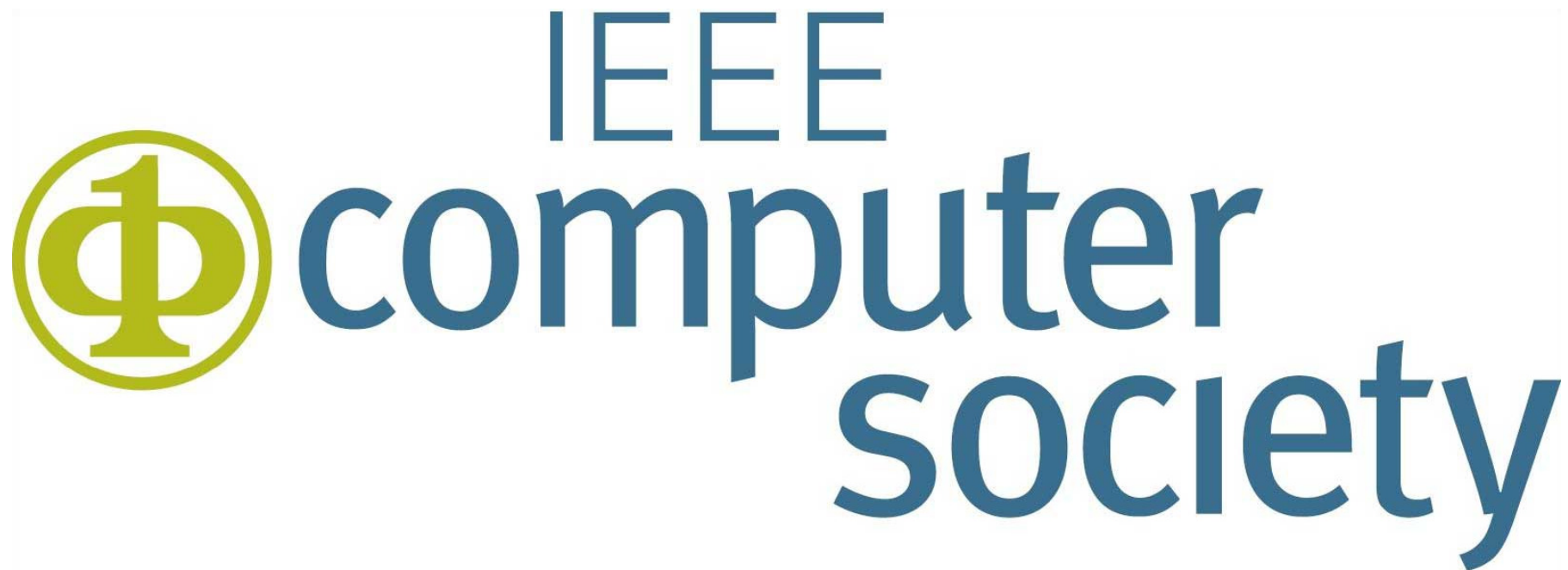
Nine Communications Technology Trends for 2020

IEEE Communications Society



- 1. THz Spectrum Heats Up Talk of 6G
- 2. AI Reaches the Boonies with Federated Learning
- 3. Meta-materials, Meta-surfaces, Meta-resonators, Meta-anything
- 4. The Cellphone is Dead. All Hail IoT!
- 5. Cellular is Dead. All Hail IT!
- 6. The Year the Telecom World Cracked
- 7. Come Fly with Me, and My Network (UAVs)
- 8. Massive MIMO Implementation Becomes a Career Plan
- 9. Everyone is Slicing and Virtualizing

Top 12 Technology Trends for 2020 by IEEE Computer Society



Source: <https://www.computer.org/publications/tech-news/trends/exclusive-content-ieee-cs-tech-trends-for-2020>

Top 12 Technology Trends for 2020 by IEEE Computer Society



- Artificial Intelligence (AI) at the edge (AI@Edge).
- Non-volatile memory (NVM) products, interfaces and applications.
- Digital twins, including cognitive twins.
- AI and critical systems.
- Practical delivery drones.
- Additive manufacturing.
- Cognitive skills for robots.
- AI/ML applied to cybersecurity.
- Legal related implications to reflect security and privacy.
- Adversarial Machine Learning (ML).
- Reliability and safety challenges for intelligent systems.
- Quantum Computing.

IEEE Collabratec and IEEE Publication Recommender



- <https://ieee-collabratec.ieee.org/>



- IEEE Publication Recommender
- Search 190+ periodicals and 1800+ conferences
- Compare critical points such as Impact Factor and Submission-To-Publication Time
- Get all the key data about IEEE publications at a glance
- Download the results of your search
- <https://publication-recommender.ieee.org/periodicals>

IEEE PDF Checker, IEEE LaTeX Checker



- https://www.ieee.org/publications/authors/pdf_checker.html
- Speed up your scholarly publishing process with the IEEE by validating your article's LaTeX files prior to submission. Avoid delays in publishing due to different versions of LaTeX, incomplete files, or other potential setbacks.
- <http://latexqc.ieee.org/>
- IEEE Graphics Analyzer
- <https://graphicsqc.ieee.org/>

- Tutorial:
<https://upload.wikimedia.org/wikipedia/commons/2/2d/LaTeX.pdf>
- Tutorial on Wiki:
- <https://en.wikibooks.org/wiki/LaTeX>



- Download it from:
 - <https://miktex.org/>
- MiKTeX (pronounced *mick-tech*) is an up-to-date implementation of TeX/LaTeX and related programs.
- TeX is a typesetting system written by [Donald Ervin Knuth](#) who says that it is *intended for the creation of beautiful books - and especially for books that contain a lot of mathematics*.

- LaTeX was originally written in the early 1980s by [Leslie Lamport](#) at SRI International.
- The current version is LaTeX2e (stylised as LaTeX2 ϵ).
- LaTeX is free software and is distributed under the LaTeX Project Public License (LPPL).
- LaTeX is a document preparation system.
- When writing, the writer uses plain text as opposed to the formatted text found in WYSIWYG ("what you see is what you get") word processors like Microsoft Word, LibreOffice Writer and Apple Pages.
- The writer uses markup tagging conventions to define the general structure of a document (such as article, book, and letter), to stylise text throughout a document (such as bold and italics), and to add citations and cross-references.
- A TeX distribution such as TeX Live or MikTeX is used to produce an output file (such as PDF or DVI) suitable for printing or digital distribution.

- **Texmaker** is a free, modern and cross-platform LaTeX editor for **linux**, **macosx** and **windows** systems that integrates many tools needed to develop documents with LaTeX, in just one application.
- Download it from:
 - <https://www.xm1math.net/texmaker/>
- Texmaker user manual
 - <https://www.xm1math.net/texmaker/doc.html>



Texmaker – Windows OS



The screenshot displays the Texmaker application window. The top menu bar includes File, Edit, Tools, LaTeX, Math, Wizard, Bibliography, User, View, Options, and Help. Below the menu is a toolbar with icons for file operations and a 'Quick Build' button. The main editing area is split into two panes. The left pane shows the source LaTeX code for 'sample.tex', which includes commands for title, author, abstract, sections, lists, equations, and theorems. The right pane shows the rendered PDF output of the same file. The rendered document has a title page with 'Sample LaTeX File', 'David P. Little', and 'July 11, 2017'. It includes an abstract, a list of points with various formatting (bold, italic, large font, subpoints), a section on equations, and a theorem about the binomial theorem. The bottom status bar shows the current file is 'sample.tex' and provides a warning about a LaTeX command. The bottom right corner indicates the encoding is UTF-8 and the font is Normal Mode.

Document: D:/sample.tex

File Edit Tools LaTeX Math Wizard Bibliography User View Options Help

Quick Build View PDF

RELATION SYMBOLS

sample.tex

31 \title{Sample \LaTeX ~File}
32 \author{David P. Little}
33 \maketitle
34
35 \begin{abstract}
36 This document represents the output from the file "sample.tex" once
compiled using your favorite \LaTeX compiler. This file should serve as a
good example of the basic structure of a ".tex" file as well as many of the
most basic commands needed for typesetting documents involving mathematical
symbols and expressions. For more of a description on how each command
works, please consult the links found on our course webpage.
37 \end{abstract}
38
39 \section{Lists}
40 =====
41 \begin{enumerate}
42 \item {\bf First Point (Bold Face)}
43 \item {\em Second Point (Italic)}
44 \item {\Large Third Point (Large Font)}
45 \begin{enumerate}
46 \item {\small First Subpoint (Small Font)}
47 \item {\tiny Second Subpoint (Tiny Font)}
48 \item {\Huge Third Subpoint (Huge Font)}
49 \end{enumerate}
50 \end{enumerate}
51 \item[{\bullet}] {\sf Bullet Point (Sans Serif)}
52 \item[{\circ}] {\sc Circle Point (Small Caps)}
53 \end{enumerate}
54
55 \section{Equations}
56 =====
57
58 \subsection{Binomial Theorem}
59 \begin{theorem}[Binomial Theorem]
60 For any nonnegative integer n , we have
61 $(1+x)^n = \sum_{i=0}^n \binom{n}{i} x^i$
62 \end{theorem}
63
64 \subsection{Taylor Series}
65 The Taylor series expansion for the function e^x is given by
66
$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \dots + \sum_{n=20}^{\infty} \frac{x^n}{n!}$$

67 \end{document}

Sample LaTeX File

David P. Little

July 11, 2017

Abstract

This document represents the output from the file "sample.tex" once compiled using your favorite PDF compiler. This file should serve as a good example of the basic structure of a ".tex" file as well as many of the most basic commands needed for typesetting documents involving mathematical symbols and expressions. For more of a description on how each command works, please consult the links found on our course webpage.

1 Lists

1. First Point (Bold Face)

2. Second Point (Italic)

3. Third Point (Large Font)

(a) First Subpoint (Small Font)

(b) Second Subpoint (Tiny Font)

(c) Third Subpoint (Huge Font)

• Bullet Point (Sans Serif)

◦ CIRCLE POINT (SMALL CAPS)

2 Equations

2.1 Binomial Theorem

Theorem 1 (Binomial Theorem) For any nonnegative integer n , we have

$$(1+x)^n = \sum_{i=0}^n \binom{n}{i} x^i$$

2.2 Taylor Series

The Taylor series expansion for the function e^x is given by

$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \dots + \sum_{n=20}^{\infty} \frac{x^n}{n!} \quad (1)$$

File Type Line Message

sample.tex Warning line 62 Foreign command \atopwithdelims[amsmath] \frac or \genfrac should be used instead[ams...

LOG FILE:
This is pdfTeX, Version 3.14159265-2.6-1.40.17 (TeX Live 2016/W32TeX) (preloaded format=pdflatex 2017.7.11) 11 JUL 2017 15:36
entering extended mode
restricted \write is enabled.
%% line parsing enabled.

Structure Messages/Log Pdf Viewer Source Viewer Ready

UTF-8 Normal Mode

Texmaker – MAC OSX



Document : /Users/pascalbrachet/Documents/test/sample.tex

Quick Build View PDF

STRUCTURE

- sample.tex
- LABELS
- BLOCKS
- Lists
- Equations
 - Binomial Theorem
 - Taylor Series
 - Sets
- Tables
- A Picture

```
19 %~~~~~%
20 % theorem/Proof Environments %
21 %~~~~~%
22 \newtheorem{theorem}{Theorem}
23 \newenvironment{proof}{\noindent{\bf Proof:}}{\hfill \Box$ \vspace{10pt}}
24
25
26 %~~~~~%
27 % Document %
28 %~~~~~%
29 \begin{document}
30
31 \title{Sample LaTeX File}
32 \author{David P. Little}
33 \maketitle
34
35 \begin{abstract}
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40 expressions. For more of a description on how each command works, please
41 consult the links found on our course webpage.
42 \end{abstract}
43
44 \section{Lists}
45 %~~~~~%
46 \begin{enumerate}
47 \item {\bf First Point (Bold Face)}
48 \item {\it Second Point (Italic)}
49 \item {\Large Third Point (Large Font)}
50 \begin{enumerate}
51 \item {\small First Subpoint (Small Font)}
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53 \item {\huge Third Subpoint (Huge Font)}
54 \end{enumerate}
55 \item {\bullet} {\bf Bullet Point (Sans Serif)}
56 \item {\circ} {\small Circle Point (Small Caps)}
57 \end{enumerate}
58
59 \section{Equations}
60 %~~~~~%
61 \subsection{Binomial Theorem}
62 \begin{theorem}[Binomial Theorem]
```

Sample LaTeX File

David P. Little

July 11, 2017

Abstract

This document represents the output from the file "sample.tex" once compiled using your favorite LaTeX compiler. This file should serve as a good example of the basic structure of a ".tex" file as well as many of the most basic commands needed for typesetting documents involving mathematical symbols and expressions. For more of a description on how each command works, please consult the links found on our course [webpage](#).

1 Lists

- First Point (Bold Face)**
- Second Point (Italic)*
- Third Point (Large Font)**
 - First Subpoint (Small Font)
 - Second Subpoint (Tiny Font)
 - Third Subpoint (Huge Font)**
- Bullet Point (Sans Serif)**
- CIRCLE POINT (SMALL CAPS)

2 Equations

2.1 Binomial Theorem

Theorem 1 (Binomial Theorem) For any nonnegative integer n , we have

$$(1+x)^n = \sum_{k=0}^n \binom{n}{k} x^k$$

2.2 Taylor Series

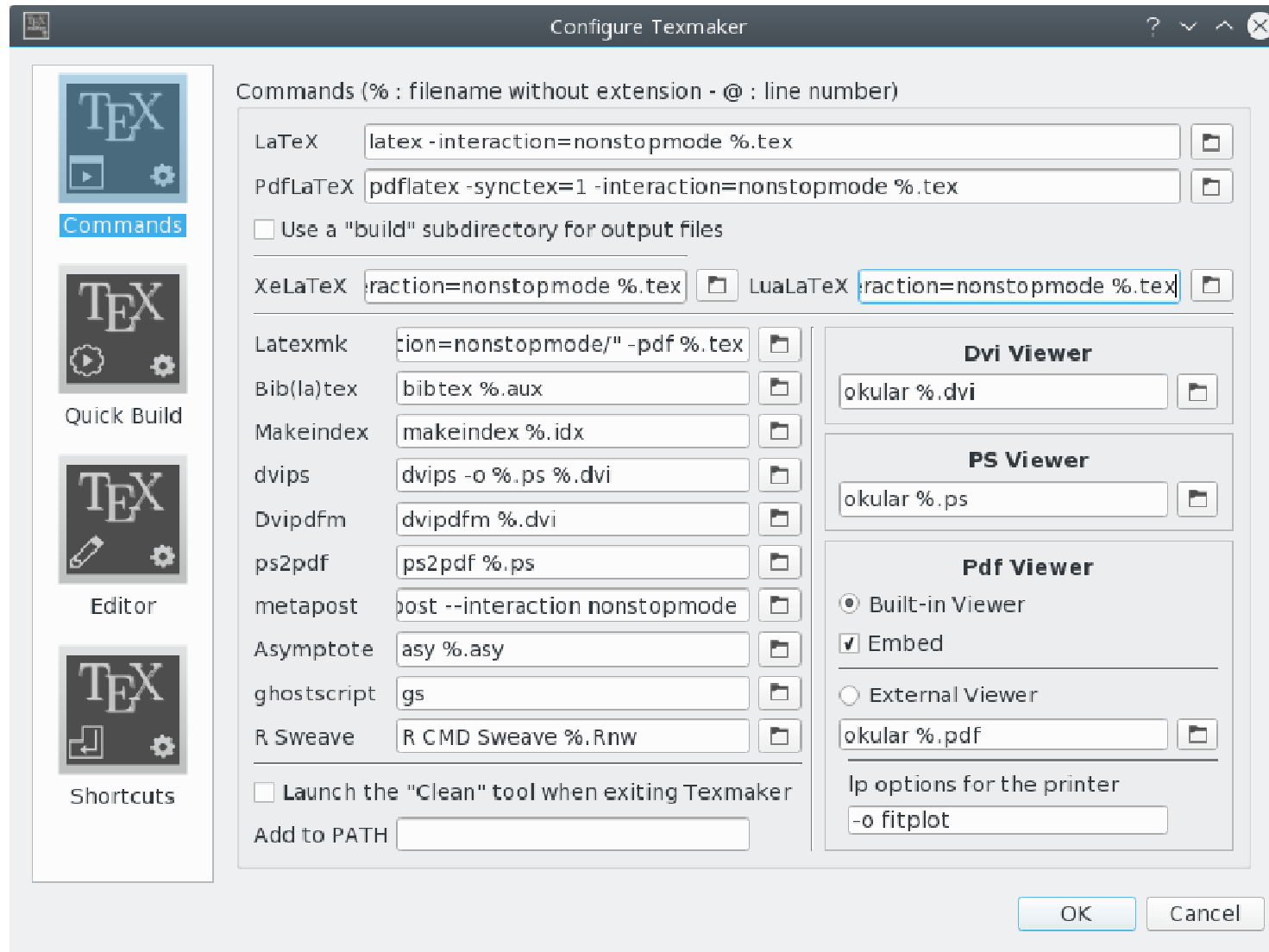
The Taylor series expansion for the function e^x is given by

$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \dots = \sum_{n=0}^{\infty} \frac{x^n}{n!} \quad (1)$$

Structure Messages Log Pdf Viewer Source Viewer Ready

UTF-8 Normal Mode

Configuring Texmaker



Setting the Preamble of Tex Document



- To define the preamble of your document, you can use the "Quick start" wizard ("Wizard" menu).

The image shows a 'Quick Start' dialog box with various settings for a LaTeX document. The settings are as follows:

- Document Class: article (with a '+' button)
- Other Options: landscape, draft, final, oneside, twoside (with a '+' button)
- Typeface Size: 10pt (with a '+' button)
- Paper Size: a4paper (with a '+' button)
- Encoding: utf8 (with a '+' button)
- Author: (empty text field)
- Title: (empty text field)
- babel Package: (checkbox) with a list of languages: english, farsi, finnish, francais, french (with a '+' button)
- geometry Package: (checkbox) with a text field containing 't=2cm,right=2cm,top=2cm,bottom=2cm'
- AMS Packages: (checked checkbox)
- makeidx Package: (checkbox)
- graphicx Package: (checkbox)
- lmodern Package: (checkbox)
- Kpfonts Package: (checkbox)
- Fourier Package: (checkbox)

At the bottom right are 'OK' and 'Cancel' buttons.

Inserting a Table



- With the "Tabular" wizard ("Wizard" menu), the LaTeX code for a tabular environment can be quickly inserted:

The "Quick Tabular" dialog box is shown, which is used to generate LaTeX code for a table. It features a preview window at the top showing a table with 4 columns and 3 rows. The first row has alignment settings: center, center, left, and right. The second row has a colspan=2 cell labeled "span". The third row has cells labeled "aa", "bb", "cc", and "dd". Below the preview, there are settings for the number of columns (4) and rows (3). The "Columns" section allows setting alignment (Right), left border, and right border (last column). The "Rows" section allows setting top border, merge columns (1 to 2), bottom border (last row), and adding vertical margin for each row. Buttons for "Apply to all columns" and "Apply to all rows" are present. The dialog ends with "OK" and "Cancel" buttons.

	c	c	l	r
1	center	center	left	right
2	span			
3	aa	bb	cc	dd

Num of Columns: 4

Columns

Column: 4

Alignment: Right

Left Border: |

Apply to all columns

Right Border (last column): |

Num of Rows: 3

Rows

Row: 3

☒ Top Border

☐ Merge columns: 1 -> 2

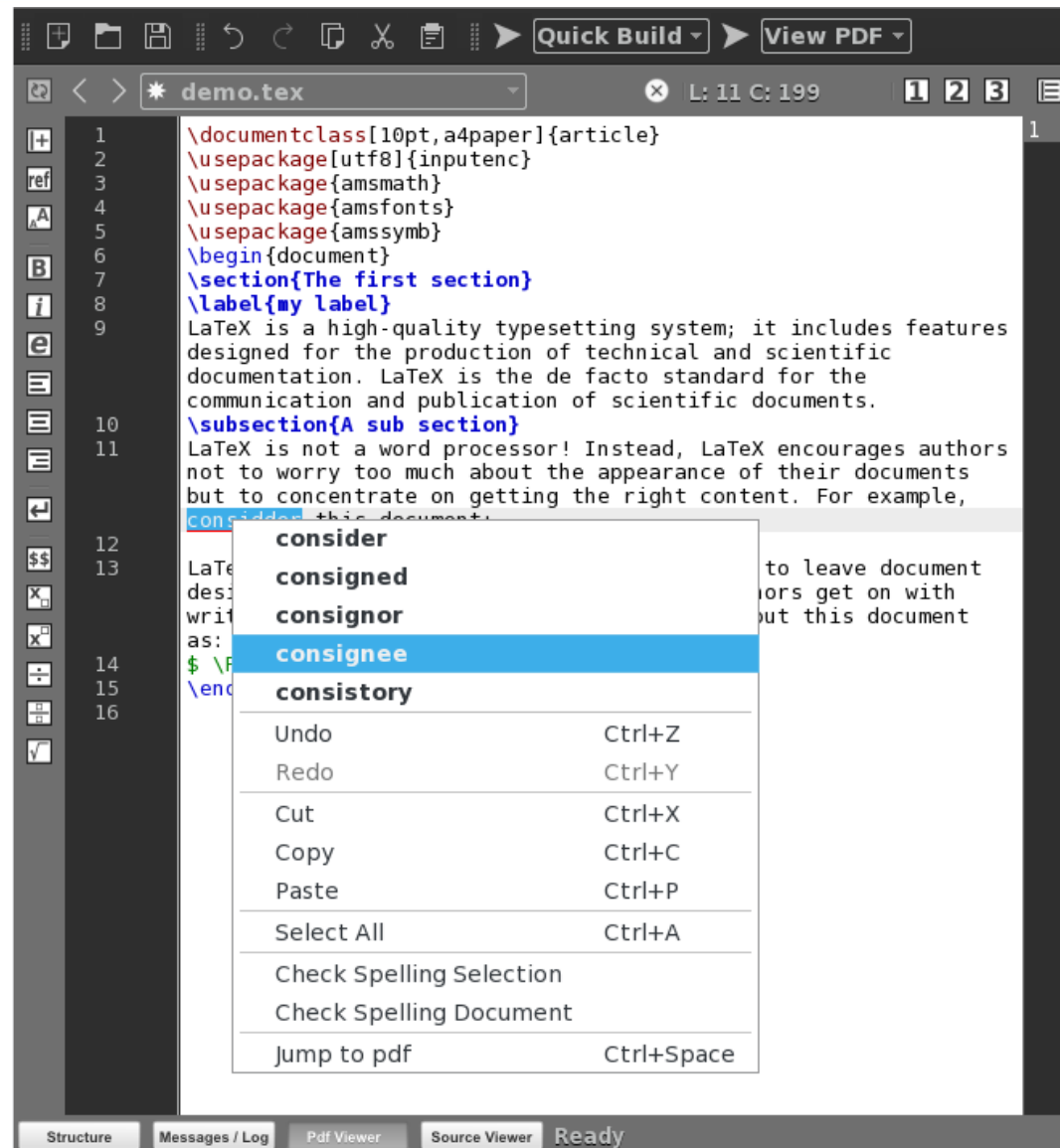
Apply to all rows

☒ Bottom Border (last row)

☐ Add vertical margin for each row

OK Cancel

Texmaker – Spell Checking



Texmaker – Easy Compilation

