A LaTeX Sample

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1 Introduction

Once upon a time there was a lonely honours student, desperate to write an awesome thesis. She hit upon the idea of making it look beautiful by using a mathematical document preparation system.

1.1 MS-Word?

MS-Word may sometimes be useful for short notes or for making a "Back in 5 minutes" sign to stick on your door, but if you want to write a serious document like an academic paper, a book or a thesis, then you should use a serious tool such as LaTeX.

1.2 Who use LaTeX?

LaTeX is not something that would find much use in a corporate office environment. Who is LaTeX for?

- You – there is no better software for writing essays, term papers, presentations, and research papers.

- Grad Students – I wrote my Masters thesis in LaTex. I cant imagine doing anything like that in Word. It would be a suicide. Dont do it to yourself. Use the proper tool for this task that tool is LaTeX.

- Writers – LaTeX was designed for publishing, and there is no other tool that will produce high quality almost-ready-to-print documents out of your manuscripts.

- Scientists and Researchers – no other tool makes it so easy to write research papers, books and journal articles.

- Professors – in the past I used LaTeX to generate great looking multiple choice exams, lecture presentation slides, lecture notes and etc.

- Developers – you want great looking documentation and user manual? This is the tool for you. LaTeX can also output to HTML so you can easily create googlable online copies of all your documents.

2 Literature review

In printing, text is emphasized by using *italics*, or possibly using **bold**.

Footnotes[1] pose no problem.

A frequently-displayed structure is a list. The following is an example of an *itemized* list.

- This is the first item of an itemized list. You can select other bullet types if you want using additional packages.

- This is the second item of the list.

We can also have *enumerated* lists:

1. This is the first item of an enumerated list. The numbering of items is automatic. You can enumerate lists with (a), (b), etc., or some other scheme. Using 1., 2., etc., is the default.

2. This is the second item of the list.

3 Figures

Figure 1 shows $\cdots$.

Figure 2 shows $\cdots$.

3.1 Tables

Table 1: Caption for the table.

1	2	3
a	b	c

4 Mathematics

For mathematics, wrap symbols in $ signs. For example, $x - 3y = 7$ or $a_1 > x^{2n}/y^{2n} > x'$. Remember that a letter like x is a formula when it denotes a mathematical symbol, and should be treated as one.

Mathematical formulas may also be displayed. A displayed formula is one-line long; multiline formulas require special formatting instructions.

$$x' + y^2 = z_i^2.$$

Don't start a paragraph with a displayed equation, nor make one a paragraph by itself.

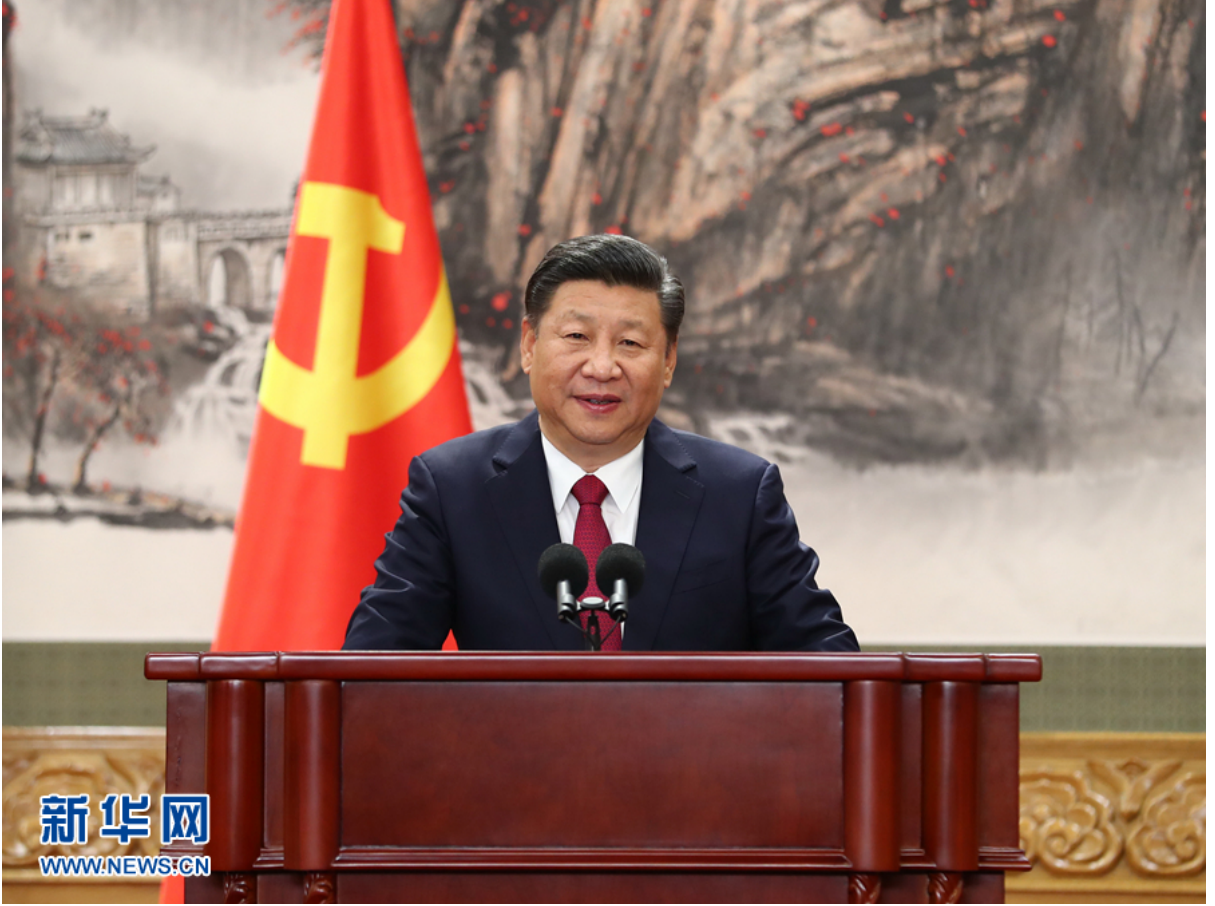[1]This is an example of a footnote.

Figure 1: The general secretary of the CPC central committee.

Numbered equations are also useful:

$$\bar{y} = \frac{1}{n} \sum_{i=1}^{n} y_i \tag{1}$$

Clearly, equation (1) gives the sample mean. The sample standard deviation can be calculated similarly:

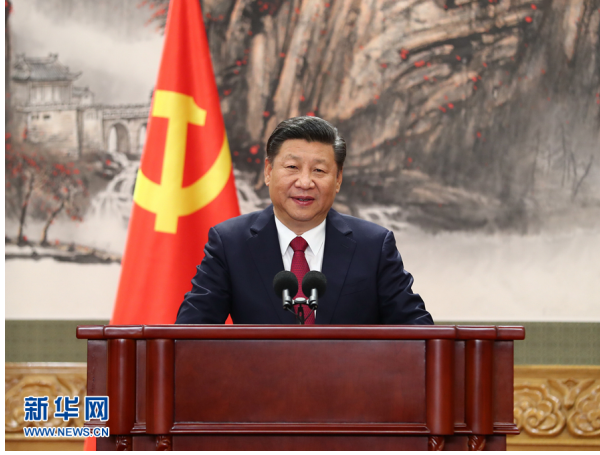$$s_y = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (y_i - \bar{y})^2}.$$

Here Smith & Miller (1986) is a section from a paper I am writing showing some additional features along with citations. The Poisson model (Smith & Miller 1986) is given by

$$y_t \sim \text{Poisson}(x_{t-1}) \tag{2a}$$
$$x_t = x_{t-1} \eta_{t-1} / \lambda \tag{2b}$$

where $\eta_t \sim \text{Beta}(\lambda b_t, (1-\lambda)b_t)$, $b_t = \lambda b_{t-1} + y_t$, and $0 < \lambda < 1$. Here we use the $\text{Beta}(\alpha, \beta)$ density $f(x) \propto x^{\alpha-1}(1-x)^{\beta-1}$, $0 \le x \le 1$. Equivalently,

$$x_t = \lambda^{-t} x_0 \prod_{i=1}^{t} \eta_i. \tag{3}$$

(a) The general secretary of the CPC central committee.

(b) The standing committee of the CPC central committee.

Figure 2: Two figures from the 19th CPC National Congress

Harvey & Fernandes (1989) show that (2) has the EWMA forecast function

$$\mathrm{E}(y_{t+h} \mid \mathcal{I}_t) = (1 - \lambda) \sum_{j=0}^{t-1} \lambda^j y_{t-j}.$$

References

Harvey, A. C. & Fernandes, C. (1989), 'Time series models for count or qualitative observations (with discussion)', *Journal of Business & Economic Statistics* **7**, 407–422.

Smith, R. L. & Miller, J. E. (1986), 'A non-Gaussian state space model and application to prediction of records', *Journal of the Royal Statistical Society (Series B)* **48**, 79–88.