Technical writing I

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Outline

The following presentation refers to advices on technical writing given in [1].

Introduction

Some things about writing in general:

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  Writing brings out gaps in your understanding, just like discussions with colleagues do. In writing you clarify your thoughts.
- *Good writing reflects clear thinking!*
  If you find a particular piece difficult to write it may be because you have not found the right sturcture to express your ideas. A good organization is a vital ingredient of technical writing.

- *Writing is difficult!*
  It is often difficult to start from scratch. Two ways to overcome this are
  1. Force yourself to write something, no matter how clumsy it may be
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Some ways to improve your writing skills:

- Ask a colleague to read and comment on your writing.
- Read as much as you can, always with a critical eye. You can learn from good *and* bad writing.
- Read books and articles on technical writing, e.g. [2].
- Read guides to English usage and style, e.g. [3].

The english language

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In the following some tips are given, how to improve your writing in a foreign language.

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- *Synonyms:* Try to remember different ways of saying things to avoid monotony in your own work!
- *Idioms:* Expressions whose meaning cannot be deduced from the words alone. For example

  by and large means *taking everything into account*

Now you have to...

...start thinking in English!

Do not compose sentences in your own language and translate them later. The result is more likely not idiomatic.

Some laguages do not have articles or use them in a different way than in English. The rules of correct usage of articles in the english language are complicated.
Two of the most important follow.

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Without article

Do not use singular countable nouns without articles. For example

The derivate is . . . or *a derivative is . . .*,
but not only *derivative is*

.

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E.g.

It's raining

and

A matrix is singular if its determinant is zero.

Active vs. passive

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- P: The answer was provided to 16 decimal places by Gaussian elimination.
- A: Gaussian elimination gave the answer to 16 decimal places.
- P: A numerical example is now given to illustrate the above result.
- A: We give a numerical example to illustrate this result.

Prefer the active to the passive voice!
Much of the passive voice weakens the communication between writer and reader. The active voice adds life to your writing.

Keep it simple!

This holds especially for us non-native English speakers. The best way to avoid errors is to keep your writing simple. Use short words and sentences to avoid complicated structures.

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Keep your writing simple in favor of your readers, who are also non-native English speakers.

Punctuating expressions

Mathematical expressions are part of the sentence and should be punctuated! Mathematical expressions may even be read as whole sentences. E.g.

$$A = B \ .$$

This means A is equal to B and makes a complete sentence with subject A predicate *is equal to* and object B. Therefore it has to be punctuated properly.

Otiose symbols

Do not use mathematical symbols unless they serve a purpose and watch out for unnecessary parentheses!
Some examples are

- A symmetric positive matrix A has real eigenvalues.
- This algorithm has $t = \log_2 n$ stages.
- The matrix $(A - \lambda I)$ is singular.

Placement of symbols

Avoid starting a sentence with a mathematical expression and separate mathematical symbols by punctuation marks or words, if possible! Otherwise it can be hard for the reader to parse the text. Some examples are

$-$: A is an ill-conditioned matrix.

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In mathematical writing the distinction between the and a is crucial! The usage of the word the can be inappropriate when the object to which it refers is (potentially) not unique or does not exist. Whereas the word a usually refers to something that might not be unique. E.g.

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If you used the term *Cholesky factorization*, do not say *Cholesky decomposition* in the same work.

Glossary for Mathematical Writing

1. Without loss of generality = I have done an easy special case.
2. By a straight forward computation = I lost my notes.
3. The details are left to the reader = I cannot do it.
4. The following alternative proof of X's result may be of interest = I cannot understand X.
5. It will be observed that = I hope you had not noticed that.
6. Correct to within an order of magnitude = Wrong.


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