Behrouz's Manual for Latex Writing

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1 General Comments

There are a number of rules that should be followed when you are writing latex documents:

1. When writing in math-mode, whether inline or stand-alone, latex treats any letters that are not accompanied by a command as a variable and render them italic. For example, take a look at this:

$$\frac{number\ of\ edges\ between\ N(i)}{total\ number\ of\ possible\ edges\ between\ N(i)},$$

   which results in an ugly-looking expression. Instead, use the command `\mbox` or `\text` for text statements inside the math mode:

$$\frac{\text{number of edges between } N(i)}{\text{total number of possible edges between } N(i)}. \tag{1}$$

   Even if the English statement is just a word, use `\mbox`. For example:

$$\frac{d}{dt}x(t), \quad \text{for } t \geq 0.$$

2. Similarly, for the mathematical functions such as logarithm, they should always be non-italic. So, never use plain ln, sin, cos, etc. and use the designated commands `\ln`, `\sin`, `\cos`. If the function does not exist, for example the function for the trace of a matrix, use the command `\DeclareMathOperator` in the preamble of your document. See the preamble of this document and how I created the command `tr` for trace(A).

3. Always refer to equations in parentheses, like Equation (1). You can use the `\eqref` for this purpose.

4. Use `align` environment instead of equation, eqnarray, etc. environments for stand-alone math equations.

5. If you are not referring to an equation, that equation **should not** have a number. You can do this by changing the align environment to align* environment or equivalently use the command `\nonumber` after `\begin{align}`.

6. Equations are part of sentences even if they are stand alone, such as
   Consider the dynamics

$$x(k+1) = A(k)x(k)$$

   Here, $k \geq 0$ and ...

   The problem with the above statement, is that the sentence Consider the dynamics *something* does not end with a punctuation mark. So, the correct statement is Consider the dynamics

$$x(k+1) = A(k)x(k).$$

   Here, $k \geq 0$ and ...

7. *In my group:* Use the prefix eqn: fig: lemma: thrm: (or thm:) prop: cor: sec: for labels related to equations, figures, lemmas, theorems, propositions, corollaries, sections, etc.

8. For the labels of equations, figures, etc. use meaningful labels: so instead of *eqn:1*, use a label like *eqn:dynamics*.

9. Specific equations, figures, sections, chapters, etc. are special names like Behrouz, so always capitalize them when referring to them. For example "Equation (1)" is correct while "equation (1)" is wrong.

10. A **very** important comment is that: never ever refer directly to sections, equations, figures, etc.'s numbers and always use labels and `\ref` command. For example, instead of writing "Item 10 is very important", I have created a label for this item by the name *item:veryimportant* and you can simply say Item 10.

2 Packages

There are a number of packages that are quite useful.

a. *geometry*: You can use this package to change the margins of a document. For example, `\usepackage[margin=1in]{geometry}` sets 1 inch margin for the document.

b. *enumerate*: This package enables us to have arbitrary numbering for enumerate environment. For example: `\begin{enumerate}[a.]` uses a., b., c., instead of the default 1., 2., 3.,. You can use other styles like, `\begin{enumerate}[(I)]` which itemizes the list by, (I), (II), (III), etc.

c. *comment*: You can always use % to comment a line or paragraph. But if you want to comment a whole part of a document, you can use this package and mark the beginning and end of the commenting part by `\begin{comment}` and `\end{comment}`

d. *todonotes*: I use this package to provide quick comments to students and collaborators. Like this

e. There are standard packages that you always want to load them including graphicx (for adding figures), amsmath, amssymb, amsthm (all for better looking math-formulas), and xcolor (to be able to change the color of the text).