Introduction to LaTeX
Final Assignment (Group 5)

Clifford Gilmore

20th March 2013

The .tex and .bib files containing your solutions should be emailed to clifford.gilmore@helsinki.fi by 15:00 on 28th March 2013. The file names should be of the form SurnameFinal.tex and Surname.bib, for example GilmoreFinal.tex, Gilmore.bib.

The subject line of the email should be "LaTeX Final Assignment".

Your assignments can be reused as templates for future projects and theses so it's a good idea to keep them!

Create a LaTeX document containing the following:

1. A preamble with:
   (a) the following AMS packages: amssymb, amsthm, amsmath, amsfonts.
   (b) In addition to these, there must be three theorem-environments, Theorem, Lemma and Definition, utilising the same numbering scheme, which is numbered by section. The Definition theorem-environment must use the definition theorem-style from the amsthm package.
   (c) You must include one command which you have defined yourself and it should take one argument.
   (d) a title, which should be "LaTeX Final Assignment".
   (e) the author, which should be yourself.
2. The document should commence with the title, followed by a table of contents and then the list of tables.
3. You must provide enough text to make four pages. The text can be the solutions to an exercise sheet from one of your mathematics courses or random text such as from http://www.lipsum.com/.

4. You must have four sections, and each section must contain one of the theorem environments you have defined, such that every environment is used at least once in the document. You must also use the command you defined above at least once.

5. A bibliography using BibTEX containing the following articles [1], [2], [3] and citations for them in the document text. Hint: Copy the BibTEX format of each article from www.ams.org/mathscinet/index.html into your `.bib` file.

6. The following (numbered) equation as well as a reference to it elsewhere in the text of your document:
   The *nuclear norm* is defined as,

$$\|T\|_N := \inf \left\{ \sum_{n=1}^{\infty} \|\phi_n\| \|x_n\| : T = \sum_{n=1}^{\infty} \phi_n \otimes x_n \right\}, \qquad (2.1)$$

   where the infimum is taken over all representations of T of the form $Tx = \sum_{n=1}^{\infty} \langle \phi_n, x \rangle x_n$, where $(\phi_n) \subset X^*$ and $(x_n) \subset X$ satisfy

$$\sum_{n=1}^{\infty} \|\phi_n\| \|x_n\| < \infty, \qquad \text{for } x \in X.$$

7. The below system (without numbering):

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \\ c_3 \end{pmatrix}$$

8. The following aligned equations and text:

   We see that, for $y_n \in Y_1$ and $y_2 \in Y_2$ we have

$$\begin{aligned}
&\pi \left(T^{n_k} S_{n_k}(y_1 \otimes y_2) - (y_1 \otimes y_2)\right) \\
&= \pi \left((T_1^{n_k} S_{n_k}^1 \otimes T_2^{n_k} S_{n_k}^2)(y_1 \otimes y_2) - (y_1 \otimes y_2)\right) \\
&= \pi \big((T_1^{n_k} S_{n_k}^1 y_1 \otimes T_2^{n_k} S_{n_k}^2 y_2) - (y_1 \otimes T_2^{n_k} S_{n_k}^2 y_2) \\
&\qquad + (y_1 \otimes T_2^{n_k} S_{n_k}^2 y_2) - (y_1 \otimes y_2)\big) \\
&\leq \|T_1^{n_k} S_{n_k}^1 (y_1) - y_1\| \|T_2^{n_k} S_{n_k}^2 (y_2)\| + \|y_1\| \|T_2^{n_k} S_{n_k}^2 (y_2) - y_2\| \longrightarrow 0,
\end{aligned}$$

   and hence T satisfies the Hypercyclicity Criterion.

9. The following table with the caption “Four researchers”

	Amy	Pete	Frank	Päivi
Commutes by	car	train	tram	bicycle
Sport	ice-hockey	judo	kendo	rugby
Home town	Espoo	Helsinki	Helsinki	Vantaa
Height	174cm	185cm	180cm	191cm

   The caption should appear in the list of tables.

10. A numbered list with three entries.

References

[1] J. H. Anderson. Derivation ranges and the identity. *Bull. Amer. Math. Soc.*, 79:705–708, 1973.

[2] L. A. Fialkow. Structural properties of elementary operators. In *Elementary operators & applications (Blaubeuren, 1991)*, pages 55–113. World Sci. Publ., River Edge, NJ, 1992.

[3] E. Saksman and H.-O. Tylli. Multiplications and elementary operators in the Banach space setting. In *Methods in Banach space theory*, volume 337 of *London Math. Soc. Lecture Note Ser.*, pages 253–292. Cambridge Univ. Press, Cambridge, 2006.