# TITLE

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Abstract. The abstract should summarize the contents of the paper in short terms. Please, avoid the use of symbols, special characters, footnotes, or formulas in the abstract as well as in the title.

**Keywords:** The list of comma separated keywords is going here.
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## 1. Introduction

This document describes in some detail preparation of articles to be submitted for publication in the Annual of Sofia University "St. Kliment Ohridski" Faculty of Mathematics and Informatics.

In `tex` file the authors should use the standard LaTeX commands. Personal macros should be used only when it is absolutely necessary and have to be put always in the preamble.

These rules must be followed:

- Do not use `\def` and `\renewcommand` commands.
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## 2. Typing text and formulas

Definitions, propositions, lemmas, theorems, equations, etc., should be introduced using the appropriate theorem-like environment and labeled. Please, make use of the respective labels when you refer to any of them.

Some examples of how these should look like follow.

**Definition 2.1.** The norm $\|\cdot\|$ of the Banach space $X$ is smooth if for any $x \in X\backslash\{0\}$ there is a unique $f \in X^*$ such that $\|f\|_* = 1$ and $f(x) = \|x\|$.

**Example 2.2.** The spaces $l_p$, $1 < p < \infty$, are strictly convex and smooth, while the spaces $l_1$ and $l_\infty$ are neither strictly convex nor smooth.

**Lemma 2.3.** *The norm $\|\cdot\|$ of $X$ is Fréchet differentiable at $0 \neq x \in X$ if and only if*

$$\lim_{t\to 0} \frac{\|x+ty\| + \|x-ty\| - 2\|x\|}{t} = 0,$$

*uniformly for each $y$ in the unit sphere $S(X)$.*

**Theorem 2.4.** *For given Banach space $(X, \|\cdot\|)$ with dual space $(X^*, \|\cdot\|_*)$ and $x \in S(X)$, the following are equivalent:*

i) *$\|\cdot\|$ is Fréchet differentiable at $x$;*
ii) *For all $(f_n)_{n=1}^\infty$, $(g_n)_{n=1}^\infty \in S(X^*)$ if $\lim_{n\to\infty} f_n(x) = \lim_{n\to\infty} g_n(x) = 1$, then $\lim_{n\to\infty} \|f_n - g_n\|_* = 0$.*

*Proof.* (i)⇒(ii). Since the norm of $X$ is Fréchet differentiable at $x$, by Lemma 2.3 for each $\varepsilon > 0$ there exists $\delta > 0$ such that

$$\|x+y\| + \|x-y\| \leq 2 + \varepsilon\|y\|$$

for any $y$ with $\|y\| < \delta$. There exists $N \in \mathbb{N}$ such that $|f_n(x) - 1| < \varepsilon\delta$ and $|g_n(x) - 1| < \varepsilon\delta$ for each $n \geq N$. Then we have

$$\begin{aligned} (f_n - g_n)(y) &= f_n(x+y) + g_n(x-y) - f_n(x) - f_n(x) \\ &\leq \|x+y\| + \|x-y\| - f_n(x) - f_n(x) \\ &\leq 2 + \varepsilon\|y\| - f_n(x) - f_n(x) \\ &\leq |f_n(x) - 1| + |g_n(x) - 1| + \varepsilon\|y\| \\ &\leq 3\varepsilon\delta. \end{aligned} \tag{2.1}$$

Hence for each $n \geq N$ by (2.1) we have

$$\|f_n - g_n\|_* = \sup_{h\in S(X)} (f_n - g_n)(h) = \sup_{h\in S(X)} \frac{(f_n - g_n)(\delta h)}{\delta} < 3\varepsilon.$$

(ii)⇒(i) is proved by arguing by contradiction. □

A direct application of Šmulian's theorem gives the following result.

**Corollary 2.5.** *If the dual norm of $X^*$ is Fréchet differentiable, then $X$ is reflexive.*

**Remark 2.6.** A good guide for writing scientific papers can be found on Terence Tao's web page [6].

## 3. Including tables and figures

Table(s) and Figure(s) are "floating objects" which should be inserted in the text as close to the point of reference as possible.

In table, please do not use any colours. Some space should be left above and below the table. In `tex` file this should be done using the environment `table` (see Table 1).

TABLE 1. Baseline characteristics of the PCOS classical phenotype patients and control group

| Characteristic | PCOS group | Control group | $p$ value |
|---|---|---|---|
| Number of cycles ICSI | 109 | 387 | |
| Age (y) | 30 | 32 | NS |
| BMI (kg/m$^2$) | $27.36 \pm 4.66$ | $22.39 \pm 2.14$ | 0.0001 |
| AMH (pmol/L) | $39.3 \pm 9.2$ | $9.8 \pm 5.9$ | $< 0.0001$ |
| PCOS type I or II | yes | no | |

PCOS = US characteristics of PCO morphology, clinical and/or biochemical hyperandrogenemia and ovarian dysfunction

Figure in the `tex` file should be inserted using

```
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\centering
\includegraphics[width=XXX]{file-name}%
\caption{Text of the figure caption\label{fig:1}}
\end{figure}
```

which will produce Figure 1. `XXX` indicates the width of the figure either in millimeters, e.g. `width=40mm` or using `\textwidth`, e.g. `width=0.5\textwidth`. `file-name` is the name of the file of the figure[1].

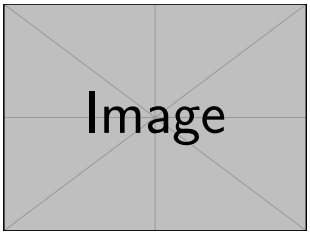


FIGURE 1. Text of the figure caption

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All illustrations are to be in gray scale or black-and-white, else appropriate conversion will be done. If the manuscript is accepted, all figure files should be submitted separately of the source `tex` or `docx` file.

[1] `pdf` file of Figure 1 can be found on http://tug.ctan.org/macros/latex/contrib/mwe/example-image.pdf.

## Acknowledgements

Write here your acknowledgements to respective persons for help or to institutions for grant funding.

The last section contains the list of references. It should be ordered alphabetically by the last name of the first author. In the text the references should be indicated by square-bracketed numbers. Please, follow exactly the samples given below in the bibliography section for journal articles [1, 3, 4, 7], books [5, Ch. 2.12], papers in proceedings volumes [2, p. 432], and web pages [6].

## References

[1] J. M. Borwein and D. Preiss, A smooth variational principle with applications to subdifferentiability and to differentiability of convex functions, Trans. Amer. Math. Soc. 303(2) (1987) 517–527.

[2] R. Deville and N. Ghoussoub, Perturbed minimization principles and applications, in: Handbook of the geometry of Banach spaces, ed. by W. B. Johnson and J. Lindenstrauss, vol. 1, North-Holland, Amsterdam, 2001, 393–435.

[3] M. Fréchet, Toute fonctionnelle continue est développable en série de fonctionnelles d'ordres entiers, C. R. Acad. Sci. Paris 148 (1909) 155–156 (in French).

[4] A. Molto, J. Orihuela, S. Troyanski and V. Zizler, Strictly convex renormings, J. London Math. Soc. 75 (2007) 647–658.

[5] R. R. Phelps, Convex functions, monotone operators and differentiability, Second Edition, Lecture Notes in Mathematics, 1364 Springer-Verlag, Berlin, 1993.

[6] T. Tao, On writing, https://terrytao.wordpress.com/advice-on-writing-papers/.

[7] S. L. Troyanski, An example of smooth space whose dual is not strictly convex, Studia Math. 35 (1970) 305–309 (in Russian).

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