LaTeX Template and Tutorial for Math Modelers

December 10, 2018

Abstract

Your abstract or summary can go here.

Contents

1 Introduction

Here are some typesetting features you may want to use when writing up your classwork, or the mathematics in your class summary. If you want to type a paragraph of text, simply start typing.

To start a new paragraph, leave a blank line before the new paragraph.

Here's a bullet list of some of the math symbols you may need. Note that any math formulas must be surrounded by dollar signs, like so: $H(s,t) = F(\alpha(s),t)$. If you surround a math formula by double dollar signs, your formula will be centered on a line by itself, like so:

$$H(s,t) = F(\alpha(s),t).$$

Whatever you type afterwards will begin again on a separate line.

- Greek letters: $\alpha, \gamma, \pi, \tau$
- product of two sets $X \times Y$
- Intersections $\cap$, unions $\cup$, and disjoint unions $\sqcup$
- *italics* and **bold**
- related to: $\sim$, homotopic to $\simeq$, and isomorphic to $\cong$
- Fractions which fit inside a paragraph of text: $\frac{az+b}{cz+d}$, and bigger fractions: $\dfrac{az+b}{cz+d}$
- Subscripts and exponents: z_1, w^2, z_2^3, $f_*(x)$, $p^{-1}(b)$
- Derivatives: $f'(x)$, integrals $\int_a^b f(x)\,dx$, and limits $\lim_{n\to\infty} a_n$ or $\lim\limits_{n\to\infty} a_n$
- Not equals: $c \neq 0$, or greater than / less than or equal: $c \geq 0$, $x \leq 17$
- functions defined in pieces:

$$p(x) = \begin{cases} x & \text{for } x \in [0,1] \\ x-1 & \text{for } x \in [2,3] \end{cases}$$

- Left quotes ` and right quotes '
- Composition: $g \circ f$, and multiplication: $g \cdot f$
- Left and Right Set Brackets need a backslash: $\{x : p(x) = b\}$
- Is an element of: $b \in B$
- $\mathbb{R}$, $\mathbb{S}^2$, $\mathbb{T}^2$, $\mathbb{Z}$

- To put a word in with a string of math symbols, use mbox: $f \sim g$ rel A, otherwise, it looks like: $f \sim grelA$.
- $p|_{\tilde{U}}$
- group presentation: $\langle a, b : ab\overline{a}\rangle$
- A lot of symbols you might want to know are just what you think they might be, preceded by a backslash: $\cos\theta, \notin, \to, \mapsto, \Leftrightarrow, \longrightarrow, \subset, \subseteq$

There are nice, pre-written environments for Theorems and Proofs, as below:

Theorem (Unique Path Lifting Property) Here's where you type in the text of the theorem.

Proof: And this is where you type in the proof! □

Lemma Here's where you put the body of a lemma.

You might also want to write up the following things:

1. A numbered list,
2. or a sequence of equations, lined up at the equals sign...

$$\begin{aligned} d(z_1, z_2) &= \int_{z_1}^{z_2} \frac{1}{t}\, dt \\ &= \ln(z_2) - \ln(z_1) \qquad \text{by the Fund Thm of Calc} \\ &= \ln\left(\frac{z_1}{z_2}\right) \end{aligned}$$

3. or some Commutative Diagrams...

$$\begin{array}{ccc} \mathbb{S}^2 & \xrightarrow{g} & \mathbb{S}^2 \\ \mathrm{S}\downarrow & & \downarrow \mathrm{S} \\ \mathbb{R}^2 & \xrightarrow{f} & \mathbb{R}^2 \end{array}$$

4. or a Table...

Column A	Column B
$T^2\#S^2$	$P^2\#P^2$
K^2	$K^2\#P^2$
$S^2\#S^2\#S^2$	$S^2\#S^2$
$P^2\#T^2$	$P^2\#P^2\#P^2\#K^2$
$K^2\#T^2\#P^2$	T^2

5. or a picture, such as in Figure 1 (you will need to use a .eps graphics file for Windows, and a .pdf graphics file for Mac).

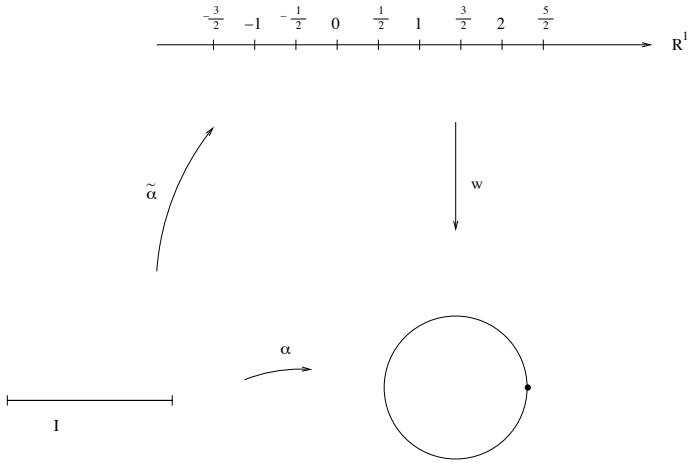

Figure 1: Lifting the circle to its universal cover

6. ...and you can always ask me *before the contest starts* if you need to typeset something that I haven't included here.

(You might want to save this document somewhere – even just email it to yourself – in case some day you decide you want to use LaTeXto typeset something else.)

2 Now You Try It!

2.1 Assumptions

For practice, type bullet list here

2.1.1 Approach

For practice, type a numbered outline of approach here

3 The Model

For practice, put a new picture here.

4 Solutions

For practice, type a few formulas here.

5 Solution Comparison Methods

For practice, type a table of data here

6 Results

7 Conclusion - Strengths and Weaknesses

References

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