



1

2 Susan Jones\* 

3 John Smith\*\*

4 Hans Anders 

5

FULL TITLE  
FULL SUBTITLE§

6

Abstract

7 The abstract should briefly summarize the contents of the paper and **should not**  
8 **contain any references.**

9 If needed, it can be split into several paragraphs.

10 The abstract should be followed by a list of keywords. The authors **must**  
11 **provide at least 3 keywords** which should be typed in lowercase (except for  
12 proper names) and separated with commas.

13 The authors can **optionally** provide the *Mathematical Subject Classification*  
14 codes by using the `msc` environment which has an **optional argument** indicating  
15 the year (the default value is 2010). However, it is **not compulsory**.

16 *Keywords:* keyword 1, keyword 2, keyword 3.

17 *2020 Mathematical Subject Classification:* code 1, code 2, code 3.

18 1. Title part

19 There are three commands in the preamble the authors are requested to  
20 use and fill with arguments:

---

\* *Thanks* note by Susan Jones.

\*\* *Thanks* note by John Smith.

§ *Title thanks* note.

---

- 21     • `AuthorEmail`
- 22     • `Affiliation`
- 23     • `Title`.

### 24   1.1. `AuthorEmail`

25   The `\AuthorEmail` command has the following syntax:

26                     `\AuthorEmail[#1]{#2}[#3]{#4}[#5],`

27   where:

28   #1 is an optional argument which can contain an author's **ORCID num-**  
 29       **ber** in the format: dddd-dddd-dddd-dddd (an author is requested to  
 30       fill this argument should they have an ORCID number),

31   #2 is a mandatory argument which should contain an author's **full name**,

32   #3 is an optional argument which can contain an author's name **in an**  
 33       **abbreviated form** (in case the full name does not fit within the  
 34       header),

35   #4 is a mandatory argument which should contain an author's **email ad-**  
 36       **dress**,

37   #5 is an optional argument which can contain a thanks footnote text if an  
 38       author wants to include one.

39   If a paper is multi-authored, then each author should invoke the command  
 40   `\AuthorEmail` separately. The order in which authors' names will appear  
 41   in the output pdf will reflect the order in which the commands have been  
 42   invoked.

### 43   1.2. `Affiliation`

44   The `\Affiliation` command has the following syntax:

45                     `\Affiliation{#1}{#2}{#3}{#4}{#5},`

46   where:

47 **#1** is a mandatory argument which should contain a **university's / in-**  
 48 **stitution's name**,

49 **#2** is a mandatory argument which should contain an **institute's / de-**  
 50 **partment's / faculty's name**,

51 **#3** is a mandatory argument which should contain a **work address in**  
 52 **the format: postal code, street name and number**,

53 **#4** is a mandatory argument which should contain the **names of a town**  
 54 **and country**,

55 **#5** is a mandatory argument which should contain the **indices of authors**  
 56 **with this affiliation** (e.g., if a given affiliation is assigned to authors  
 57 1 and 3, one should put '1,3' as **#5**).

58 If there are multiple affiliations occurring in the paper, then each of them  
 59 needs to be included in a separate `\Affiliation` command. In such a case  
 60 the order in which subsequent `\Affiliation` commands are executed can  
 61 be arbitrary<sup>1</sup>.

62 If a given argument is not applicable, leave it empty.

### 63 1.3. Title

64 The `\Title` command has the following syntax:

65 
$$\backslash\mathrm{Title}[\#1]\{\#2\}[\#3],$$

66 where:

67 **#1** is an optional argument which can contain the **paper's title in an**  
 68 **abbreviated form** if the full title does not fit within the header,

69 **#2** is a mandatory argument which should contain **paper's title in the**  
 70 **full form**. If it needs to be broken into multiple lines, one can do  
 71 that by inserting the `'\\'` commands in the appropriate places,

72 **#3** is an optional argument which can contain a **footnote text** if the  
 73 author wants to attach one to the title.

---

<sup>1</sup>The reference for the last argument of the `\Affiliation` command is the order in which the `\AuthorEmail` command for the given author was invoked.

## 74 2. Extra packages and commands

75 The authors can define their own commands in the preamble of the docu-  
 76 ment. They can also use additional packages, however since the `BSLstyle`  
 77 class automatically loads certain packages, they are asked not to include  
 78 these packages in the preamble as it can lead to compilation errors. The  
 79 list of packages pre-loaded by `BSLstyle` is as follows:

	• <code>amsmath</code>	• <code>graphicx</code>	• <code>datetime</code>
	• <code>amsfonts</code>	• <code>enumitem</code>	• <code>totpages</code>
	• <code>amscd</code>	• <code>url</code>	• <code>fancyhdr</code>
	• <code>amssymb</code>	• <code>hyperref</code>	• <code>footmisc</code>
80	• <code>amsthm</code>	• <code>xargs</code>	• <code>setspace</code>
	• <code>caption</code>	• <code>titling</code>	• <code>textcase</code>
	• <code>etoolbox</code>	• <code>lineno</code>	• <code>xstring</code>
	• <code>cleveref</code>	• <code>aliascnt</code>	

## 81 3. Maths: Environments and formulas

### 82 3.1. Mathematics environments

83 The authors are requested to use predefined mathematics environments the  
 84 list of which is presented below:

85	• <code>definition</code> ( <code>\begin{definition}...</code> <code>\end{definition}</code> )
86	• <code>theorem</code> ( <code>\begin{theorem}...</code> <code>\end{theorem}</code> )
87	• <code>remark</code> ( <code>\begin{remark}...</code> <code>\end{remark}</code> )
88	• <code>proposition</code> ( <code>\begin{proposition}...</code> <code>\end{proposition}</code> )
89	• <code>corollary</code> ( <code>\begin{corollary}...</code> <code>\end{corollary}</code> )
90	• <code>fact</code> ( <code>\begin{fact}...</code> <code>\end{fact}</code> )
91	• <code>conjecture</code> ( <code>\begin{conjecture}...</code> <code>\end{conjecture}</code> )

- 92     • `\lemma (\begin{lemma}...\end{lemma})`
- 93     • `\example (\begin{example}...\end{example})`
- 94     • `\claim (\begin{claim}...\end{claim})`
- 95     • `\proof (\begin{proof}...\end{proof})`.

96 Each of the above-mentioned environments (except for *proof*) has its un-  
 97 numbered version which will be yielded if an asterisk is added to the  
 98 environment command (e.g., `\begin{example*}...\end{example*}`).

99 In case the author wants to use a mathematics environment which is  
 100 not listed above, they should define it in the preamble in a standard  
 101 **amsthm**-manner and assign to it one of the following theorem styles:

- 102     • **definition**
- 103     • **plain**
- 104     • **remark**.

105 The anchor for numbering should be **theorem**. For instance:

```
106     \theoremstyle{definition}
107     \newtheorem{statement}[theorem]{Statement}
```

108 If one wants the newly introduced environment to properly cooperate with  
 109 the **cleveref** package, they should put in the preamble the following lines  
 110 of code (below the exemplary new environment is **Statement** defined in the  
 111 **definition** style):

```
112     \theoremstyle{definition}
113     \newaliascnt{Statement}{theorem}
114     \newtheorem{statement}[Statement]{Statement}
115     \aliascntresetthe{Statement}
116     \crefname{Statement}{statement}{statements}
```

117 Below come some examples of usage of mathematical environments.

118 **DEFINITION 3.1** (Strong finite model property [2, Sect. 6.2]). Let  $\Lambda$  be a  
 119 normal modal logic,  $\mathbf{M}$  a set of finitely based models such that  $\Lambda = \Lambda_{\mathbf{M}}$ ,

and  $f$  a function mapping natural numbers to natural numbers.  $\Lambda$  has the  $f(n)$ -size model property with respect to  $\mathbf{M}$  if every  $\Lambda$ -consistent formula  $\phi$  is satisfiable in a model in  $\mathbf{M}$  containing at most  $f(|\phi|)$  states.

$\Lambda$  has the strong finite model property with respect to  $\mathbf{M}$  if there is a computable function  $f$  such that  $\Lambda$  has the  $f(n)$ -size model property with respect to  $\mathbf{M}$ .  $\Lambda$  has the polysize model property with respect to  $\mathbf{M}$  if there is a polynomial  $p$  such that  $\Lambda$  has the  $p(n)$ -size model property with respect to  $\mathbf{M}$ .

$\Lambda$  has the  $f(n)$ -size model property (respectively, strong finite model property, polysize model property) if there is a set of finitely based models  $\mathbf{M}$  such that  $\Lambda = \Lambda_{\mathbf{M}}$  and  $\Lambda$  has the  $f(n)$ -size model property (respectively, strong finite model property, polysize model property) with respect to  $\mathbf{M}$ .

LEMMA 3.2 (Zorn's Maximum Principle [8]). *In a closed set  $\mathfrak{A}$  of sets  $A$  there exists at least one,  $A^*$ , not contained as a proper subset in any other  $A \in \mathfrak{A}$ .*

THEOREM 3.3 (McKinsey & Tarski [4]).  $\mathbf{S4} \vdash \varphi$  iff  $\mathfrak{A}_X \models \varphi$  for every dense-in-itself metrizable space  $X$ .

CONJECTURE (Goldbach). Every even integer greater than 2 can be expressed as the sum of two prime numbers.

Remark 3.4. Every countable subset of  $\mathbb{R}$  has Lebesgue measure 0.

If a list (such as the `itemize` or `enumerate` environment) is placed at the beginning of a mathematical environment such as `definition`, `theorem`, `proof`, it automatically starts in a new line.

FACT 3.5 (Axioms of ZFC [3]).

AXIOM 0. *Set existence.*

$$\exists x(x = x).$$

AXIOM 1. *Extensionality.*

$$\forall x \forall y (\forall z (z \in x \leftrightarrow z \in y) \rightarrow x = y).$$

AXIOM 2. *Foundation.*

$$\forall x [\exists y (y \in x) \rightarrow \exists y (y \in x \wedge \neg \exists z (z \in x \wedge z \in y))].$$

150 AXIOM 3. *Comprehension scheme.* For each formula  $\phi$  with free vari-  
 151 ables among  $x, z, w_1, \dots, w_n$ ,

$$152 \quad \forall z \forall w_1, \dots, w_n \exists y \forall x (x \in y \leftrightarrow x \in z \wedge \phi).$$

153 AXIOM 4. *Pairing.*

$$154 \quad \forall x \forall y \exists z (x \in z \wedge y \in z).$$

155 AXIOM 5. *Union.*

$$156 \quad \forall \mathcal{F} \exists A \forall Y \forall x (x \in Y \wedge Y \in \mathcal{F} \rightarrow x \in A).$$

157 AXIOM 6. *Replacement Scheme.* For each formula  $\phi$  with free variables  
 158 among  $x, y, A, w_1, \dots, w_n$ ,

$$159 \quad \forall A \forall w_1, \dots, w_n [\forall x \in A \exists! y \phi \rightarrow \exists Y \forall x \in A \exists y \in Y \phi].$$

160 On the basis of Axioms 0, 1, 3, 4, 5 and 6, one may define  $\subset$  (subset),  
 161  $\emptyset$  (empty set),  $S$  (ordinal successor;  $S(x) = x \cup \{x\}$ ), and the notion of  
 162 wellordering. The following axioms are then defined.

163 AXIOM 7. *Infinity.*

$$164 \quad \exists x (\emptyset \in x \wedge \forall y \in x (S(y) \in x)).$$

165 AXIOM 8. *Power set.*

$$166 \quad \forall x \exists y \forall z (z \subset x \rightarrow z \in y).$$

167 AXIOM 9. *Choice.*

$$168 \quad \forall A \exists R (R \text{ well orders } A).$$

169 COROLLARY 3.6 (van Benthem [6]).  $E$  is not provably arithmetical in  $ZF$ .

170 PROOF:  $ZF + AC \vdash E(\phi^m, \phi^o)$  and  $ZF \vdash E(\phi^m, \phi^o) + AC^{u0}$ . The latter  
 171 implies, by Jech's result, that  $\sim ZF \vdash E(\phi^m, \phi^o)$ . But then  $E$  cannot be  
 172 provably arithmetical in  $ZF$ , since  $ZF + AC$  is conservative over  $ZF$  with  
 173 respect to arithmetical statements. (If  $\phi$  is arithmetical, i.e., all quantifiers  
 174 in  $\phi$  are relativized to  $\omega$ , and  $ZF + AC \vdash \phi$ , then, since  $ZF \vdash (ZF)^L$  and

175  $ZF \vdash (AC)^L$ ,  $ZF \vdash \phi^L$ , where  $L$  defines the constructible universe. Now  
 176  $\omega$  is absolute and, therefore,  $ZF \vdash \phi$ .  $\square$

177 PROPOSITION 3.7 (Segerberg [5]). Suppose that  $L$  is a classical system.  
 178 Let  $\mathcal{C}$  be any class of frames. If every modal axiom of  $L$  is valid in  $\mathcal{C}$ , then  
 179  $L$  is consistent with respect to  $\mathcal{C}$ .

180 PROOF: The proof goes by induction on the length of derivations in  $L$ .  
 181 Every nonmodal axiom is easily seen to be valid in  $\mathcal{C}$ . The modal axioms  
 182 are valid in  $\mathcal{C}$  by hypothesis.

183 Suppose  $A$  and  $A \rightarrow B$  are valid in  $\mathcal{C}$ . Let  $M$  be any model on any  
 184 frame in  $\mathcal{C}$ . Take any  $w$  in  $M$ . Then  $M, w \models A$  and  $M, w \models A \rightarrow B$ . So,  
 185 by truth definition,  $M, w \models B$ . Hence MP preserves validity in  $\mathcal{C}$ .

186 Suppose finally that  $A \leftrightarrow B$  is valid in  $\mathcal{C}$ . Let  $M$  be any model on any  
 187 frame in  $\mathcal{C}$ . Since  $A \leftrightarrow B$  is true in  $M$ ,  $\|A\|^M = \|B\|^M$ . Then  $A \leftrightarrow B$   
 188 must hold at every point in  $M$ . Hence RE preserves validity in  $\mathcal{C}$ .  $\square$

### 189 3.2. Mathematical formulas

190 Below are some examples of mathematical formulas.

191 The so-called Dirac delta is a measure  $\delta(x) : \mathcal{B}(\mathbb{R}) \rightarrow \overline{\mathbb{R}}_+$  defined as  
 192 follows:

$$193 \quad \delta(A) = \begin{cases} 1, & \text{if } 0 \in A, \\ 0, & \text{if } 0 \notin A. \end{cases} \quad (3.1)$$

194 If we switch to informal definition, then the formula (3.1) is replaced by:

$$195 \quad \delta(x) = \begin{cases} +\infty, & \text{if } x = 0, \\ 0, & \text{if } x \neq 0. \end{cases} \quad (3.2)$$

196 Here is a simple sequent-based proof of the formula  $((A \rightarrow C) \vee (B \rightarrow$   
 197  $C)) \rightarrow ((A \wedge B) \rightarrow C)$ :

$$198 \quad \frac{\frac{\frac{}{A, B, C \vdash C} (\text{Ax})}{A, B, A \rightarrow C \vdash C} (\text{MP}) \quad \frac{\frac{}{A, B, C \vdash C} (\text{Ax})}{A, B, B \rightarrow C \vdash C} (\text{MP})}{A, B, (A \rightarrow C) \vee (B \rightarrow C) \vdash C} (\vee \vdash)}{\frac{\frac{A, B, (A \rightarrow C) \vee (B \rightarrow C) \vdash C}{A \wedge B, (A \rightarrow C) \vee (B \rightarrow C) \vdash C} (\wedge \vdash)}{(A \rightarrow C) \vee (B \rightarrow C) \vdash A \wedge B \rightarrow C} (\vdash \rightarrow)}{\vdash ((A \rightarrow C) \vee (B \rightarrow C)) \rightarrow (A \wedge B \rightarrow C)} (\vdash \rightarrow)$$



199 And here is a formula that estimates the number of elements of a struc-  
 200 ture yielded by a generating stream reasoning algorithm for DatalogMTL  
 201 (see [7]):

$$202 \quad \left( 4 \cdot \left( \frac{w + 2 \cdot \text{step}}{\gcd(\mathcal{T}_I \cup \mathbf{N} \cup \{\text{step}\})} + 1 \right)^2 \right) \cdot P \cdot |\mathcal{O}_I|^A \quad (3.3)$$

## 203 4. Sectioning: This is a section header

204 Here come the contents of the section.

### 205 4.1. This is a subsection header

206 Here come the contents of the subsection.

#### 207 4.1.1. This is a subsubsection header

208 Here come the contents of the subsubsection.

209 **This is a paragraph header** Here come the contents of the paragraph.

210 *This is a subparagraph header* Here come the contents of the subpara-  
 211 graph.

## 212 5. Bibliography management

213 The authors are requested to use `BIBTEX` to process their bibliographies. It  
 214 involves creating a separate `.bib` file with bibliography entries and putting  
 215 it in the same folder as the main `.tex` source file.

216 In order for `LATEX` to generate a bibliography which will be formatted in  
 217 accordance with `BSLbibstyle`, one needs to execute the following sequence  
 218 of commands:

219 `\bibliographystyle{BSLbibstyle}`

220 `\bibliography{#1}`

221 in the place where the bibliography is to be displayed (`#1` is the name (with-  
 222 out the file type extension) of the `.bib` file with bibliography entries). The

223 authors can use the attached bibliography template (named `biblio.bib`)  
 224 to create their own bibliography file. More information about bibliography  
 225 management with BibTeX see [1].

226 There are three rules the authors are asked to abide by when preparing  
 227 their `.bib` files:

228 **Rule 1:** Always use journal names and names of proceedings series in their  
 229 **full form**. For instance: `Journal of Logic and Computation` rather  
 230 than `(J. Logic Comput.)` or `Lecture Notes in Computer Science`  
 231 rather than `LNCS`.

232 **Rule 2:** Whenever for a given publication occurring in the bibliography  
 233 there exists a DOI number, include it in the bibliography entry in  
 234 the `.bib` file. Use, however, **plain DOI numbers** rather than  
 235 full links, so for example `10.2307/2267577` rather than  
 236 `http://dx.doi.org/10.2307/2267577`.

237 **Rule 3:** When providing page numbers of a given bibliography entry use  
 238 an ndash (i.e., `--`) rather than a hyphen (i.e., `-`) to separate the first  
 239 page and the last page numbers. For example: `pages = {153--169}`  
 240 rather than `pages = {153-169}`.

241 **Acknowledgements.** Acknowledgements such as funding information or  
 242 thanks for reviewers' remarks can be put here.

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262 **novative Applications of Artificial Intelligence Conference, IAAI**  
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