

LogicAssistant User Guide

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This user guide has been created to assist users of the LogicAssistant Natural Deduction Proof solving tool. The steps below will assist users with the use of the main features of this application.

1 Proof Validity

In order to check whether a proof you have written is valid please follow the following steps:

1. Log-on to the LogicAssistant website, and you should see the main page of the application

The screenshot shows the LogicAssistant web application interface. At the top is a navigation bar with links for 'LogicAssistant', 'Validity Checker', and 'User Guide'. Below this is a header section with the 'LogicAssistant' logo. The main content area is divided into four sections: 'Key', 'Proof', 'Rule', and 'Rule Selection'. The 'Key' section contains a table of logical symbols and their meanings, along with buttons for 'Check Proof Validity' and 'Upload Proof'. The 'Proof' section features a large grid for writing a proof, with a list of line numbers on the left. The 'Rule' section is currently empty. The 'Rule Selection' section contains a list of logical rules and a button to 'Add Lemma'. At the bottom, there are buttons for 'Submit' and 'Hint', and a status indicator for 'Hints are Off'.

Symbol	Meaning
\wedge	AND
\vee	OR
\rightarrow	IMPLIES
\leftrightarrow	ONLY
\neg	NOT
FALSE	FALSE

Check Proof Validity

Upload Proof

Choose file No file chosen

Upload

Hints are Off

Submit Hint

Rule Selection

- GIVEN
- ASSUMPTION
- \wedge Introduction
- \wedge Elimination
- \vee Introduction
- \vee Elimination
- \rightarrow Introduction
- \rightarrow Elimination
- \leftrightarrow Introduction
- \leftrightarrow Elimination
- \sim Introduction
- \sim Elimination
- $\sim\sim$ Elimination
- Available
- Add Lemma

Figure 1: LogicAssistant home page

2. Type your proof into the left text box

Proof

1		$A \wedge B$	
2		$B \rightarrow C$	
3		$A \wedge (B \vee$	
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Submit
Hint
▼

Figure 2: Proof box

3. Using the buttons on the right hand side of the page, add an associated rule to each line of your proof. Type in any line references required, indicated by '?'.

Rule

	GIVEN
	GIVEN
	ASSUMPTION
	\wedge -Intro (1,)

Submit
Hint
▼

Rule Selection

GIVEN

ASSUMPTION

\wedge Introduction

\wedge Elimination

\vee Introduction

\vee Elimination

\rightarrow Introduction

\rightarrow Elimination

\leftrightarrow Introduction

\leftrightarrow Elimination

\neg Introduction

\neg Elimination

$\neg\neg$ Elimination

✓ Available

Add Lemma

Figure 3: Proof rules

4. Once you are happy with your proof click on the "Submit" button at the bottom of the page

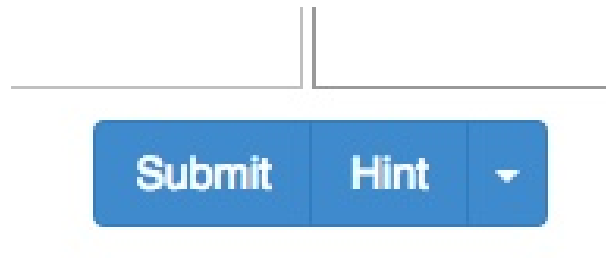


Figure 4: Submit Button

5. The box at the bottom of the page will notify you as to whether your proof is valid, or a mistake has been made in the proof

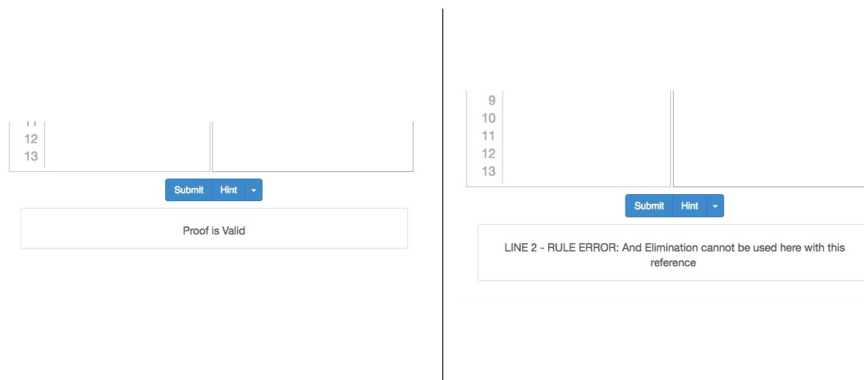


Figure 5: System Messages

6. If an error has occurred go back to step 2. Otherwise you have successfully solved your proof.

2 Goal Validity

Before solving a proof, in order to check whether it is valid follow the following steps:

1. Click on the "Check Proof Validity" button on the left hand side of the page (this can be done even in the middle of solving a proof)



Figure 6: Button to validity page

2. The Validity Checker Page should now be displayed

[LogicAssistant](#) [Validity Checker](#) [User Guide](#)

Validity Checker

Key

Symbol	Meaning
\wedge	AND
\vee	OR
\rightarrow	IMPLIES
\leftrightarrow	ONLY
\neg	NOT
FALSE	FALSE

[Back to Proof Checker](#)

Premises

1

2

3

4

5

6

7

8

9

Result

[Check Validity](#)

Figure 7: Validity Checker Page

3. Type your desired premises into the top box (if you have any), and result into the bottom box

Premises

1	$A \wedge B$
2	
3	
4	
5	
6	
7	
8	
9	

Result

Figure 8: Enter your premises and result

4. Click on the "Check Validity" button, and the result of the validity check will be displayed in the box at the bottom of the page

Premises

1	$A \rightarrow B$
2	A
3	
4	
5	
6	
7	
8	
9	

Result

Conclusion IS provable using these premises

Premises

1	A
2	
3	
4	
5	
6	
7	
8	
9	

Result

Conclusion is NOT provable using these premises

Figure 9: Validity Checker results

5. To navigate back to the main proof page, click on the "Back to Proof Checker" button on the left hand side of the page



Figure 10: Navigate home

3 Hints

If you become stuck at any point in the proof, hints can be generated as follows:

1. Type as much of your proof as you can (this could mean leaving a gap in the middle), and leave a space before typing your resulting expression

Proof		Rule
1	$A \rightarrow (B \rightarrow C)$	GIVEN
2	---- $A \wedge B$	ASSUMPTION
3	---- A	\wedge -Elim (2)
4	---- $B \rightarrow C$	\rightarrow -Elim (1,3)
5		
6	$A \wedge B \rightarrow C$	\rightarrow -Intro (2,6)
7		
8		
9		
10		
11		
12		
13		

Figure 11: Type your partial proof

2. To turn on basic hints, click the "Hint" button once so that it turns orange

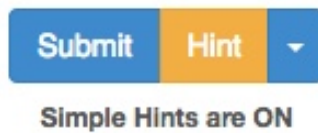


Figure 12: Turn on hints

3. Press the "Submit" button, and your hint should be displayed in the box at the bottom

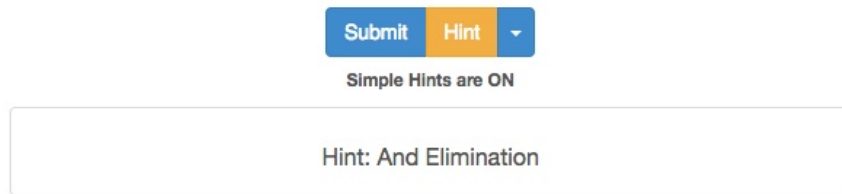


Figure 13: Hint output

4. To turn on advanced hints, click the "Hint" button twice so that it turns green

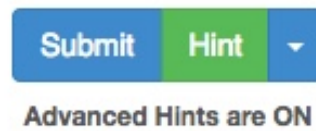


Figure 14: Turn on advanced hints

5. Press the "Submit" button, and your advanced hint should be displayed in the box at the bottom

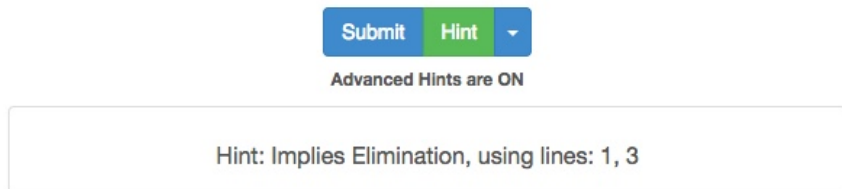


Figure 15: Advanced hint output

4 Lemmas

In order to add a Lemma to your proof, follow these instructions:

1. Click the "Add Lemma" button on the button bar on the right hand side of the page



Figure 16: Add Lemma Button

2. Type your required premises (if there are any) and lemma result into the "Lemma Checker"

Premises

1	A
2	B
3	$A \wedge B \rightarrow C$
4	
5	
6	
7	
8	
9	

Result

C

Figure 17: Lemma inputs

3. Press the "Add Lemma" button at the bottom of the page



Figure 18: Lemma Button

4. If the lemma is valid, it will automatically be added to your proof, and can be referenced using the "Available" rule

5 Saving & Loading Proofs

In order to save a proof:

1. Make sure you have fully inserted the proof you want to save
2. Press the "Save Proof As" button in the sub-menu at the bottom of the page

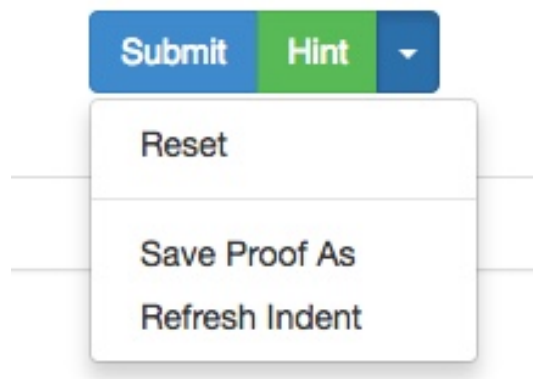


Figure 19: Save Proof As button

3. Choose your desired file destination folder and name

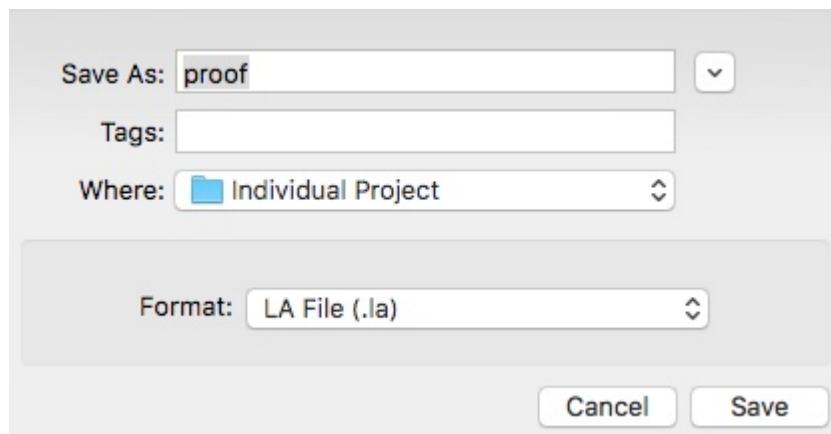


Figure 20: Select directory to save proof

4. Press "Save"

In order to load a proof:

1. Click the "Choose File" button on the left hand side of the page

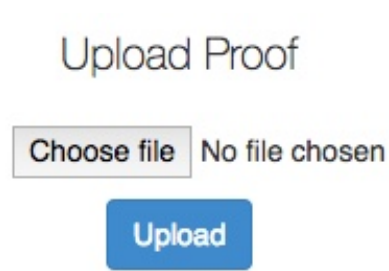


Figure 21: Upload proof button

2. Find the saved proof in your file directory

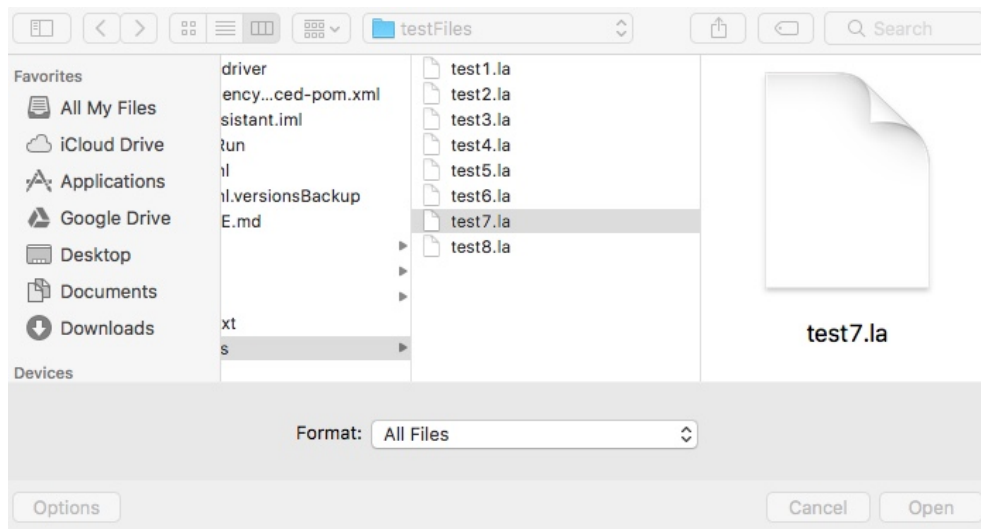


Figure 22: Select file to upload

3. Click "Open"
4. Click the "Upload" button below
5. Your proof will be inserted into the main proof boxes on the page