How to type-set Fitch natural deductions using GNU troff, pic and eqn

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Introduction

Itch is a notation for natural deduction (Pelletier and Hazen, 2024), and troff is a software system for type-setting using Unix™ and related operating systems (Ossanna and Kernighan, 1994). Brian W. Kernighan was one of the creators of Unix and the C programming language. pic is a system for typesetting graphs, also created by Kernighan (1982). GROFF AKA GNU troff is the implementation I am using (FSF, 1990). There are other competitors, but this is the version I use.

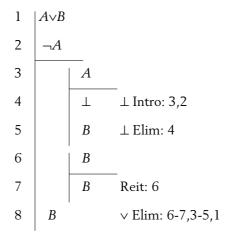


Figure 1. Proof that $A \lor B$, $\neg A : B$. The line numbering is in the left-most margin. Then there is a vertical line which is as long as the proof. The step 1-2 in the proof is were the premises lives. The horisontal line after step 2 is usually referred to as the *fitch line*. The two groups, 3–5 and 3–6 are sub-proofs, with their own premises, vertical lines and fitch lines

The Fitch notations has got its name after its inventor, Fredric Fitch. This notation seems to be a de facto standard: It is used in all the text books I have been able to find electronically, and seems to be taught at logics courses in mathematics as well as philosophy. I wrote this note while learning Fitch; I used the writing was a method for

learning. My intention is to demonstrate how to format natural deduction on this platform. I cannot teach you how to format scientific text, neither can I give an introduction to natural deduction.

```
set_steps_and_depths(8,3)
start_proof(START);
add_premis(START, "A \lor B");
add_premis(START,"\neg A");
premis_end(START);
start_proof(SUB1);
add_premis(SUB1, "A");
premis_end(SUB1);
add_step(SUB1,"\_","\_ Intro: 3,2");
add_step(SUB1, "B", "\bot Elim: 4");
end_proof(SUB1);
start_proof(SUB2);
add_premis(SUB2, "B");
premis_end(SUB2);
add_step(SUB2, "B", "Reit: 6");
end_proof(SUB2);
add_step(START, "B", "\vee Elim: 6-7, 3-5, 1");
end_proof(START)
```

Figure 2. The PIC code needed to generate Figure 1.

References

FSF, Free Software Foundation, Groff (1990).

Kernighan, Brian W., "PIC — A language for typesetting graphics," Software: Practice and Experience 12 (1982).

Ossanna, Joseph F. and Kernighan, Brian W., "Troff Userâs Manual," Computing Science Technical Report 54 (1994).

Pelletier, Francis Jeffry and Hazen, Allen, "Natural Deduction Systems in Logic" in *The Stanford Encyclopedia of Philosophy (Spring 2024 Edition)*, ed. Zalta, E. N. and U. Nodelman (2024).