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

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Introduction

Fitch 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.

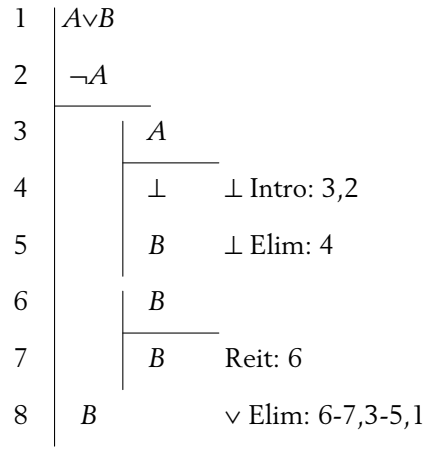

Figure 1. Proof that $A \vee B, \neg A \therefore B$. The line numbering is in the left-most margin. Then there is a vertical line which is as long as the proof. The step 1-2 in the proof is were the premises lives. The horisontal line after step 2 is usually referred to as the *fitch line*. The two groups, 3–5 and 3–6 are sub-proofs, with their own premisses, 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∨B");
add_premis(START,"¬A");
premis_end(START);

start_proof(SUB1);
add_premis(SUB1,"A");
premis_end(SUB1);
add_step(SUB1,"⊥","⊥ Intro: 3,2");
add_step(SUB1,"B","⊥ 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","∨ 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," C*omputing 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).