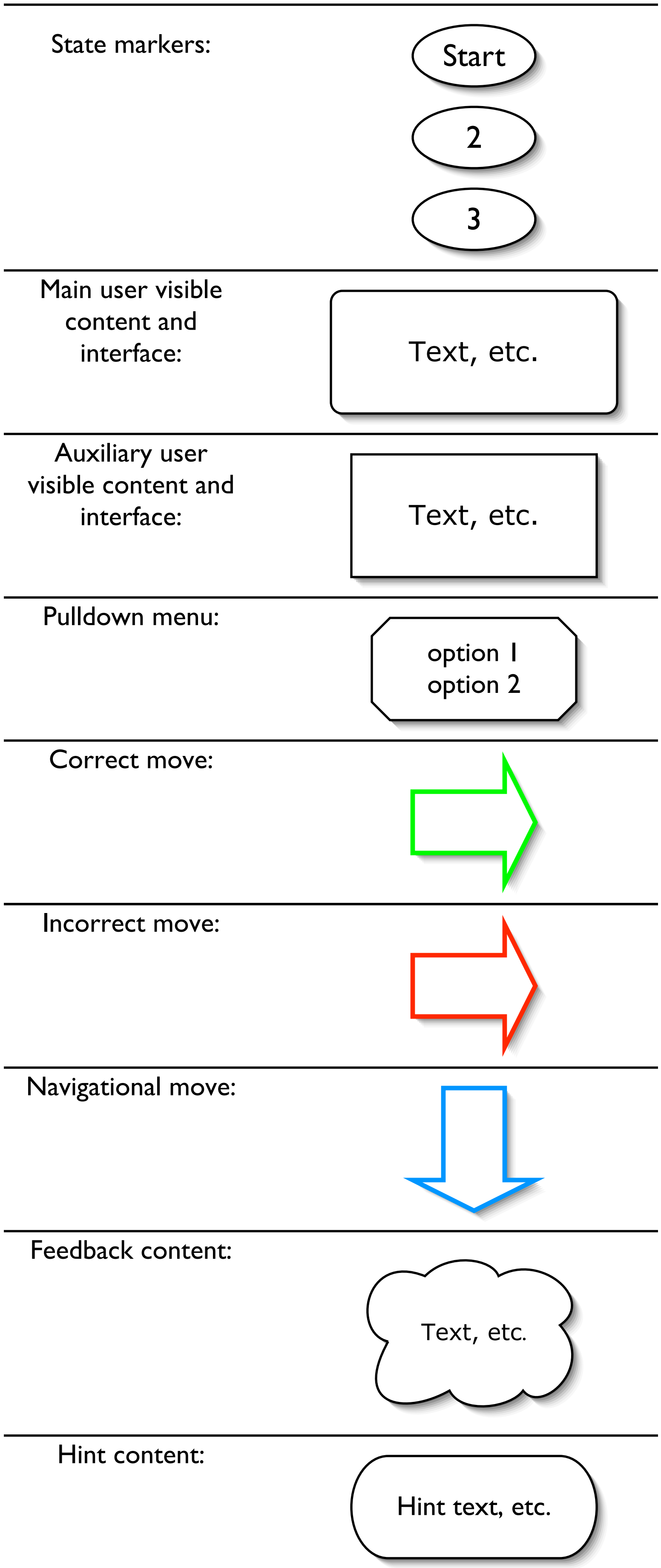
Legend:


State markers:
Start
2
3
Main user visible content and interface:
Text, etc.
Auxiliary user visible content and interface:
Text, etc.
Pulldown menu:
option 1
option 2
Correct move:
Incorrect move:
Navigational move:
Feedback content:
Text, etc.
Hint content:
Hint text, etc.

Start

Complete the following derivation by filling in the missing justification. To fill in the justification on a given line, just click anywhere on that line.

1.	B	Premise
2.	C → (A & ¬B)	Premise
3.	C	Assum.
4.	A & ¬B	?
5.	¬B	?
6.	⊥	?
7.	¬C	?

4 5 6 7

A B C D

Completed derivation:

1.	B	Premise
2.	C → (A & ¬B)	Premise
3.	C	Assum.
4.	A & ¬B	→ E: 2, 3
5.	¬B	&ER: 4
6.	⊥	⊥I: 1, 5
7.	¬C	¬I: 6

A

Complete the correct justification for line 4 using the pull-down menus below to fill in the missing components.

→E &I	:	2 , 3 3 , 2

→E → answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

&I → While the main connective of the formula is a conjunction, the two conjuncts don't appear on their own lines earlier in the derivation, as &I would require in order to derive the formula on this line.

2 , 3 → answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

3 , 2 → Remember that the first line cited for an application of →E is the line on which the conditional appears.

B

Complete the correct justification for line 5 using the pull-down menus below to fill in the missing components.

&EL
&ER
¬I

:

1
2
3
4
5
6
7

&ER

answered only this

Good. Now complete the justification by making a selection from the other pull-down menu.

answered both

That's right.

&EL

You are correct that the rule used is conjunction elimination, but you've got the wrong variant. &EL is used to derive the left-hand conjunct, whereas this formula is the right-hand one.

¬I

While the main connective of this formula is a negation, it couldn't have been derived by negation introduction, since no contradiction has been derived prior to this line.

4

answered only this

Good. Now complete the justification by making a selection from the other pull-down menu.

answered both

That's right.

1
2
3

The formula on that line is neither a conjunction, nor a falsum, so there is no way, given the choice of rules available, that the selected line could be used to derive ¬B in this case.

5+

Only lines prior to the current line in the derivation can be cited as justification for a rule's application.

C

Complete the correct justification for line 6 using the pull-down menus below to fill in the missing components.

$\bot$I : [1 2 3 4 5 6 7] [1 2 3 4 5 6 7]

1 → answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

2 3 4 → Recall that falsum introduction must be applied to a formula and its negation, in that order. Since the negation of the selected formula does not appear anywhere in the derivation, it can't be the positive half of a contradictory pair.

6+ → Only lines prior to the current line in the derivation can be cited as justification for a rule's application.

5 → answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

2 3 4 → The selected formula is not a negation, so it can't be the negative half of a contradictory pair. Recall that falsum introduction must be applied to a formula and its negation, in that order.

6+ → Only lines prior to the current line in the derivation can be cited as justification for a rule's application.

D

Complete the correct justification for line 6 using the pull-down menus below to fill in the missing components.

¬E
¬I
:
1
2
3
4
5
6
7

¬I

answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

¬E → Negation elimination removes a negation from the assumption in whose scope a contradiction is derived. This formula is the negation of that assumption, so it couldn't have been derived using negation elimination.

6

answered only this → Good. Now complete the justification by making a selection from the other pull-down menu.

answered both → That's right.

2
3
4
5
→ The only line that can justify an application of either indirect rule is the last line of a subderivation, and the formula on that line must be the falsum.

7 → Only lines prior to the current line in the derivation can be cited as justification for a rule's application.

Hint sequences by state:

A

A compound formula can be derived either by using the introduction rule for its main connective, or using an elimination rule if it appears as a positive subformula of an earlier line in the derivation.

↓

Check the formulae on previous lines in the derivation to see where this formula appears as a positive subformula, then apply elimination rules in order to extract it.

↓

$A \ \& \ \neg B$ appears as the consequent of the conditional on line 2, while the antecedent of that conditional, C, appears as the assumption on line 3, so in this case, the formula can be derived using conditional elimination.

B

A compound formula can be derived either by using the introduction rule for its main connective, or using an elimination rule if it appears as a positive subformula of an earlier line in the derivation.

↓

Check the formulae on previous lines in the derivation to see where this formula appears as a positive subformula, then apply elimination rules in order to extract it.

↓

$\neg B$ appears as the right-hand conjunct of the conjunction just derived on line 4, so in this case, the formula can be derived by applying $\&E \ R$ to that line.

C

Recall that the falsum is used to explicitly represent that a contradiction has been derived, i.e., that both a formula and its negation have been derived.

↓

Check the formulae on previous lines in the derivation to see if both a formula and the negation of that formula appear on any two lines.

↓

Both B and ¬B appear in this derivation, on lines 1 and 5, respectively. Applying the rule ⊥I to these two lines is all you need to do to derive the falsum on line 6.

D

The only rules that involve a single subderivation are the two indirect rules, ¬I and ¬E, and the rule for introducing conditionals, which can be used only to derive a conditional. Since the formula derived is not a conditional, only one of the indirect rules could have been used here.

↓

Compare the formula derived with the assumption that opened the subderivation immediately preceding the new line. If the formula is the negation of the assumption, then negation introduction is the rule used. If the assumption is the negation of the formula derived, then it was negation elimination.

↓

Since C is the assumption made and ¬B is the formula derived, the rule used in this case must be negation introduction.