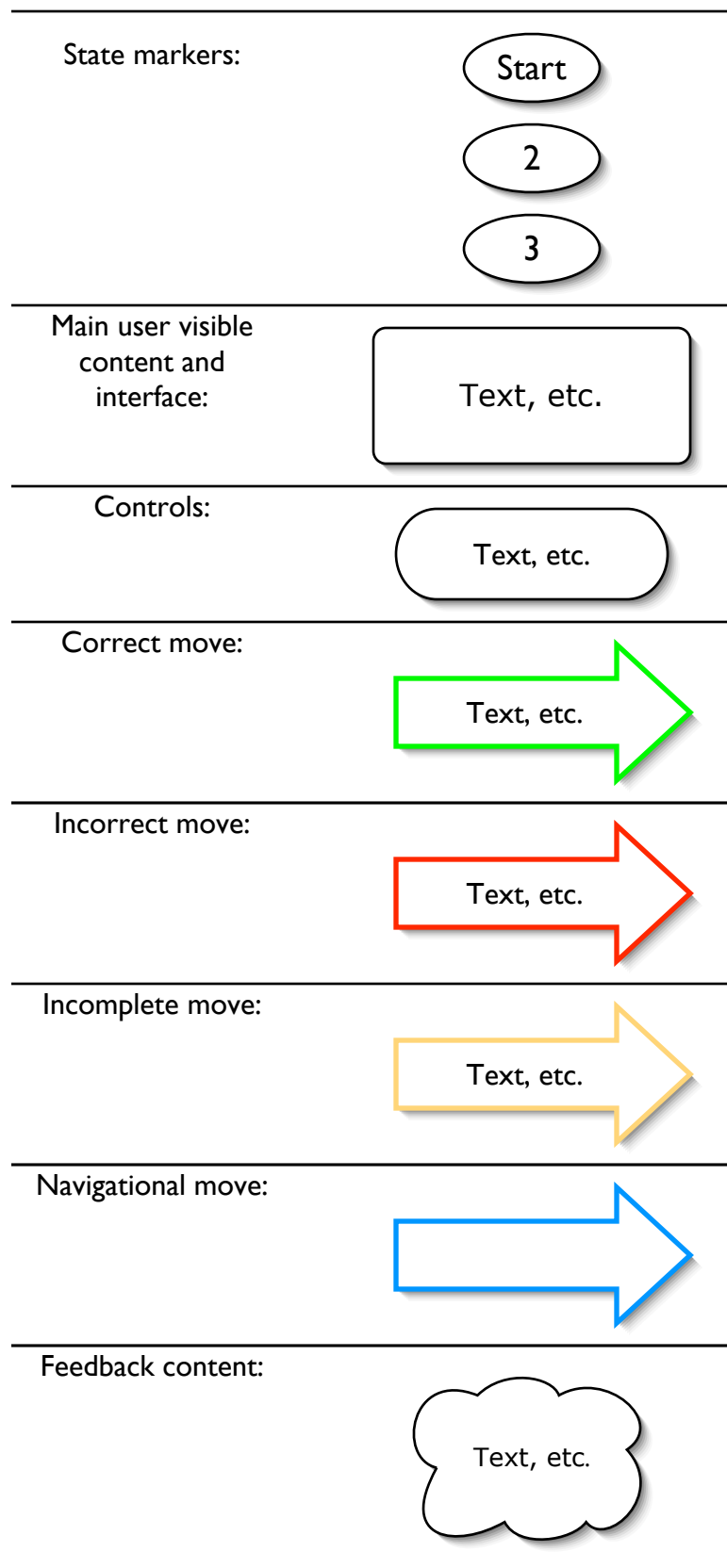


Legend:



Start

Insert the missing parentheses into the following formula.

To insert a pair of parentheses, first click on the main connective of the subformula around which the first set of parentheses should go. Once you've selected a connective, indicate which choice of placement is correct by clicking on the button (A, B, or C) that displays the correctly inserted parentheses.

$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) C(x) \& D(x) \& (\exists x) E(x)$

A

B

C

Hint

&

\vee

&

&

A

B

A

2

A

Recall that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

B

Recall the order of precedence of the connectives:
 $(\neg, \&, \vee, \rightarrow, \leftrightarrow)$

C

You've already inserted the parentheses for that connective.

2

Hover over A

$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) C(x) \& (D(x) \& (\exists x)) E(x)$

Hover over B

$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) C(x) \& (D(x) \& (\exists x) E(x))$

Hover over C

$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) C(x) (\& D(x) \& (\exists x) E(x))$

A

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

2

B

That's right!

3

C

A parenthesis should never open directly onto a connective.

2

Insert the missing parentheses into the following formula.

To insert a pair of parentheses, first click on the main connective of the subformula around which the first set of parentheses should go. Once you've selected a connective, indicate which choice of placement is correct by clicking on the button (A, B, or C) that displays the correctly inserted parentheses.

$$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) C(x) \& (D(x) \& (\exists x)E(x))$$

A

B

C

Hint

&

 \vee

&

&

A

B

4

C

A



Recall that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

B



Recall the order of precedence of the connectives:
 $(\neg, \&, \vee, \rightarrow, \leftrightarrow)$

C



You've already inserted the parentheses for that connective.

4

Hover over A

$(\forall x) A(x) \& (\exists x) B(x) \vee ((\forall x) C(x) \& (D(x))) \& (\exists x)E(x))$

Hover over B

$(\forall x) A(x) \& (\exists x) B(x) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))$

Hover over C

$(\forall x) A(x) \& (\exists x) B(x) \vee ((\forall x) C(x) \& (D(x) \& (\exists x)E(x))))$

A

Parentheses should never be inserted between an already-matched pair of parentheses.

4

B

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

4

C

That's right!

5

Insert the missing parentheses into the following formula.

To insert a pair of parentheses, first click on the main connective of the subformula around which the first set of parentheses should go. Once you've selected a connective, indicate which choice of placement is correct by clicking on the button (A, B, or C) that displays the correctly inserted parentheses.

$$(\forall x) A(x) \& (\exists x) B(x) \vee ((\forall x) C(x) \& (D(x) \& (\exists x)E(x))))$$

A

B

C

Hint

&

 \vee

&

&

6

B

C

C

A

Recall that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

B

Recall the order of precedence of the connectives:

 $(\neg, \&, \vee, \rightarrow, \leftrightarrow)$

C

You've already inserted the parentheses for that connective.

6

Hover over A

$((\forall x) A(x) \& (\exists x)) B(x) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))$

Hover over B

$((\forall x) A(x) \& (\exists x) B(x)) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))$

Hover over C

$(\forall x) (A(x) \& (\exists x)) B(x) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))$

A

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

6

B

That's right!

6

C

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

7

Insert the missing parentheses into the following formula.

To insert a pair of parentheses, first click on the main connective of the subformula around which the first set of parentheses should go. Once you've selected a connective, indicate which choice of placement is correct by clicking on the button (A, B, or C) that displays the correctly inserted parentheses.

$$((\forall x) A(x) \& (\exists x) B(x)) \vee ((\forall x) C(x) \& (D(x) \& (\exists x)E(x))))$$

A

B

C

Hint

&

 \vee

&

&

C

7

C

C

A



Recall that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

B



Recall the order of precedence of the connectives:
(\neg , $\&$, \vee , \rightarrow , \leftrightarrow)

C



You've already inserted the parentheses for that connective.

8

Hover over A

$(((\forall x) A(x) \& (\exists x) B(x)) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))))$

Hover over B

$((\forall x) (A(x) \& (\exists x) B(x)) \vee (\forall x) (C(x) \& (D(x) \& (\exists x)E(x)))))$

Hover over C

$(((\forall x) A(x) \& (\exists x) B(x)) \vee (\forall x)) (C(x) \& (D(x) \& (\exists x)E(x))))$

A

That's right!

8

B

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

7

C

Parentheses should never be inserted between a quantifier and the expression to its immediate right.

7

That's right! You've correctly inserted all the missing parentheses.

$(((\forall x) A(x) \& (\exists x) B(x)) \vee ((\forall x) C(x) \& (D(x) \& (\exists x)E(x)))))$

A

B

C

Hint

Hint

Start,
2

Recall the two things that determine the order in which we insert missing parentheses:

1) The order of precedence of the connectives
(\neg , $\&$, \vee , \rightarrow , \leftrightarrow)

2) The convention that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

Also recall that the parentheses within atomic formulae, those surrounding quantifiers, and the outermost parentheses in a quantified-over formula cannot be omitted, and hence no parentheses can be inserted in any of these locations.

Since we never insert parentheses around negations, the connective with the highest precedence, the first connective around which parentheses should be inserted is conjunction, the connective with the next highest precedence. If there are multiple occurrences of a connective, we insert parentheses around the rightmost occurrence first.

Remember that parentheses should never be inserted between a quantifier and the formula following it, nor should any parenthesis ever open onto a connective.

3, 4

Recall the two things that determine the order in which we insert missing parentheses:

1) The order of precedence of the connectives
(\neg , $\&$, \vee , \rightarrow , \leftrightarrow)

2) The convention that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

Also recall that the parentheses within atomic formulae, those surrounding quantifiers, and the outermost parentheses in a quantified-over formula cannot be omitted, and hence no parentheses can be inserted in any of these locations.

You've already inserted parentheses around the rightmost occurrence of negation, but there are more occurrences of that connective. Since parentheses are inserted around all occurrences of a connective before moving on to the next connective, the next pair of parentheses should be inserted around the conjunction to the immediate left of the one around which parentheses were just inserted.

Remember that parentheses should never be inserted between a quantifier and the formula following it, in between an already matched pair of parentheses, nor should any parenthesis ever open onto a connective.

5, 6

Recall the two things that determine the order in which we insert missing parentheses:

1) The order of precedence of the connectives
(\neg , $\&$, \vee , \rightarrow , \leftrightarrow)

2) The convention that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

Also recall that the parentheses within atomic formulae, those surrounding quantifiers, and the outermost parentheses in a quantified-over formula cannot be omitted, and hence no parentheses can be inserted in any of these locations.

You've already inserted parentheses around the two rightmost occurrences of negation, but there is another occurrence of that connective. Since parentheses are inserted around all occurrences of a connective before moving on to the next connective, the next pair of parentheses should be inserted around the third and final conjunction.

Remember that parentheses should never be inserted between a quantifier and the formula following it, in between an already matched pair of parentheses, nor should any parenthesis ever open onto a connective.

7,8

Recall the two things that determine the order in which we insert missing parentheses:

1) The order of precedence of the connectives
(\neg , $\&$, \vee , \rightarrow , \leftrightarrow)

2) The convention that if there are multiple occurrences of a given connective, we insert parentheses around the rightmost occurrence first.

Also recall that the parentheses within atomic formulae, those surrounding quantifiers, and the outermost parentheses in a quantified-over formula cannot be omitted, and hence no parentheses can be inserted in any of these locations.

You've already inserted parentheses around all occurrences of negation, so the next connective to consider is disjunction. There is a single occurrence of disjunction in this formula, so that connective is the next around which parentheses should be inserted.

Remember that parentheses should never be inserted between a quantifier and the formula following it, in between an already matched pair of parentheses, nor should any parenthesis ever open onto a connective.