



- double neg } make → fr → De Morgan
- Simp
- associative } reorder
- commutative }
- def } beg end
- De Morgan - not change complexity
- Distribute

A = I'll see you  
 B = my hair is short

$$A \wedge (A \vee B) \equiv A$$

$$\begin{aligned} (A \wedge A) \vee (A \wedge B) & \text{ dist} \\ A \vee (A \wedge B) & \text{ simp} \\ (A \vee A) \wedge (A \vee B) & \text{ dist} \\ A \wedge (A \vee B) & \text{ simp} \end{aligned}$$

$$\begin{aligned} (A \vee \perp) \wedge (A \vee B) & \text{ simp} \\ A \vee (\perp \wedge B) & \text{ dist} \\ A \vee \perp & \text{ simp} \\ A & \text{ simp} \end{aligned}$$

A	B	A	$A \wedge (A \vee B)$
0	0	0	0
0	1	0	0
1	0	1	1
1	1	1	1

$$A \rightarrow B \equiv (A \wedge B) \vee (\neg A \wedge B) \vee (\underbrace{\neg A \wedge \neg B}_{\text{dem}})$$

$\neg A \vee B$	$\downarrow$	$\neg \neg(\neg A \vee B)$	$\neg(\neg \neg A \wedge \neg B)$	$\neg(A \wedge \neg B)$	$\downarrow$	$\neg A \vee \neg \neg B$	$\neg(A \wedge \neg B)$	$\text{def}$	$(A \wedge B) \vee (\neg A \wedge B) \vee \neg(A \vee B)$	$\downarrow$	$((A \wedge B) \vee \neg A) \wedge ((A \wedge B) \vee B)$	$\vee$	$\neg(A \vee B)$
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$$\begin{aligned}
 \underbrace{A \rightarrow B}_{\neg A \vee B} &\equiv (A \wedge B) \vee \underbrace{(\neg A \wedge B) \vee (\neg A \wedge \neg B)}_{(A \vee \neg A) \wedge B} \\
 &\equiv (A \wedge B) \vee \underbrace{((\neg A \wedge B) \vee (\neg A \wedge \neg B))}_{((A \vee \neg A) \wedge B) \vee (\neg A \wedge (B \vee \neg B))} \\
 &\quad \downarrow \quad \downarrow \\
 &\quad \text{True} \quad \text{B} \\
 &\quad \wedge \quad \vee \\
 &\quad \text{True} \quad \neg A \\
 &\quad \wedge \quad \vee \\
 &\quad \text{True} \quad \neg A \\
 &\quad \vee \quad \vee \\
 &\quad \neg A \vee B
 \end{aligned}$$

$\begin{matrix} X \vee X \\ X \end{matrix}$

SMP

$A \rightarrow B$	given
$\neg A \vee B$	def
$B \vee \neg A$	commute
$(T \wedge B) \vee \neg A$	simp
$((A \vee \neg A) \wedge B) \vee \neg A$	simp
$(A \wedge B) \vee (\neg A \wedge B) \vee \neg A$	dist
" $\vee (\neg A \wedge T)$	simp
$(\neg A \wedge (B \vee \neg B))$	simp
$(A \wedge B) \vee (\neg A \wedge B) \vee (\neg A \wedge \neg B) \vee (\neg A \wedge B)$	dist
$(A \wedge B) \vee (\neg A \wedge B) \vee (\neg A \wedge \neg B)$	simp