Hunter Black
CS 2603-001

$(x \rightarrow False) = (\neg x)$	{¬ as →}
$(\neg(x \wedge y)) = ((\neg x) \vee (\neg y))$	{∧ DeMorgan}
$(x \vee (\neg x)) = True$	{∨ complement}
$(x \wedge (\neg x)) = False$	{∧ complement}
$(\neg True) = False$	{¬*True*}
$(\neg False) = True$	{¬*False*}
$(True \rightarrow x) = x$	{→ identity}
$(x \wedge True) = x$	{∧ identity}
$(x \wedge y) = (y \wedge x)$	{∧ commutative}
$(x \wedge (y \wedge z)) = ((x \wedge y) \wedge z)$	{∧ associative}

1. $(x \rightarrow False) = (\neg x)$
    a. $(\neg x \vee False) = (\neg x)$ {Implication}
    b. $(\neg x) = (\neg x)$ {∨ Identity}
2. $(\neg(x \wedge y)) = ((\neg x) \vee (\neg y))$
    a. $(\neg(x \wedge y)) = ((\neg x) \vee (\neg y))$
3. $(x \vee (\neg x)) = True$
    a. $(\neg x) \vee x = True$ {∨ Commutative}
    b. $(\neg x) \vee x = x \rightarrow x$ {Implication}
    c. $x \rightarrow x = True$ {Self-Implication}
4. $(x \wedge (\neg x)) = False$
    a. $(x \wedge (\neg x)) = False$
5. $(\neg True) = False$
    a. $\neg(False \rightarrow False) = False$ {Self-Implication}
    b. $\neg(\neg False \vee False) = False$ {Implication}
    c. $\neg(\neg False) = False$ {∨ Identity}
    d. $False = False$ {Double-Negative}
6. $(\neg False) = True$
    a. $(\neg False) = \neg(\neg True)$ {¬*True* }
    b. $(\neg False) = True$ {Double Negation}
7. $(True \rightarrow x) = x$
    a. $(\neg True \vee x) = x$ {Implication}
    b. $(x \vee \neg True) = x$ {∨ Commutative}
    c. $(x \vee False) = x$ {¬*True*}
    d. $x = x$ {∨ Identity}
8. $(x \wedge True) = x$
    a. $(x \wedge (x \vee True) = x$ { ∨ Identity}
    b. $(True \vee x) \wedge x = x$ { ∨ Commutative 2x}
    c. $x = x$ { ∧ Absorption}
9. $(x \wedge y) = (y \wedge x)$
    a. $\neg(\neg x) \wedge \neg(\neg y) = (y \wedge x)$ {Double Negation 2x}
    b. $\neg((\neg x) \vee (\neg y)) = (y \wedge x)$ {∨ DeMorgan}
    c. $\neg((\neg y) \vee (\neg x)) = (y \wedge x)$ {∨ Commutative}
    d. $\neg(\neg y) \wedge \neg(\neg x) = (y \wedge x)$ {∨ DeMorgan}
    e. $(y \wedge x) = (y \wedge x)$ {Double Negation 2x}

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10. $(x \wedge (y \wedge z)) = ((x \wedge y) \wedge z)$
    a. $(x \wedge (y \wedge z)) = ((x \wedge y) \wedge z)$