

Submission 1.2

be nice dude!!

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1 Problem 1

$R \implies \neg M$
 $\neg R \implies \neg M$

Smith's assertion is false. No matter whether taxes are raised or not, there is a premise that will handle it, so it is impossible that both are false because $(A \wedge \neg A) = \text{True}$.

2 Problem 2

(c) and (e) can follow because of the contrapositive of the original argument.

3 Problem 3

$S \implies (R \implies X) \forall X \geq \$3,560$

- (a) You do not have to file a tax return.
- (b) Nothing follows; they do not have to file a tax return under IRS Publication 17 or commit tax fraud.
- (c) You have to file a tax return.
- (d) $X < \$3,650$.
- (e) Nothing follows; their income could be anything.

4 Problem 4

$KP \vee M$
 $\neg KP$

$\therefore M$

M [DS]

5 Problem 5

$R \implies F$
 $F \implies \neg R$

$\therefore \neg R$

$\neg F \implies \neg R$ [ContraPos]
 $\neg R$ [MP]

6 Problem 6

$S \implies C$
 $\neg S$

$\therefore \neg C$

$\neg S \vee C$ [CDis]
 C [MP]

7 Problem 7

$A \implies \neg G$
 $M \implies A$

$\therefore G \implies \neg M$

$G \implies \neg A$ [ContraPos]
 $\neg A \implies \neg M$ [ContraPos]
 $G \implies \neg M$ [HS]

8 Problem 8

$H \implies M$
 $M \wedge \neg H$

$\therefore E$

$H \implies \neg M$ [ContraPos]
 E [ContraPrm]

9 Problem 9

$$O \leftrightarrow E$$

$$\neg S \implies \neg E$$

$$S \implies \neg E$$

$$\therefore \neg O$$

$$(O \implies E) \wedge (E \implies O) \text{ [Equiv]} \neg E \vee \neg E \text{ [Taut and CD]} \neg E \text{ [Rep]} \neg E \implies \neg O \text{ [ContraPos]} \neg O \text{ [MP]}$$

10 Problem 10

\wedge is associative:

A	B	C	$(A \wedge B) \wedge C$	$A \wedge (B \wedge C)$
T	T	T	T	T
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

\vee is associative:

A	B	C	$(A \vee B) \vee C$	$A \vee (B \vee C)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	T	T
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	F

\implies is not associative:

A	B	C	$(A \implies B) \implies C$	$A \implies (B \implies C)$
T	T	T	T	T
T	T	F	F	F
T	F	T	T	T
T	F	F	T	T
F	T	T	T	T
F	T	F	F	T
F	F	T	T	T
F	F	F	F	T

\leftrightarrow is associative:

A	B	C	$(A \leftrightarrow B) \leftrightarrow C$	$A \leftrightarrow (B \leftrightarrow C)$
T	T	T	T	T
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	T	T

11 Problem 11

In this argument A and B have to be either a tautology or a contradiction because those are the only cases where A and B will logically have the same value. (T and T, F and F)

12 Problem 12

This statement will always be contingent and never a tautology or contradiction because in those 2 cases A and B have the same value, so they would be logically equivalent.

13 Problem 13

This statement cannot be a contradiction or tautology because then they would be logically equivalent and so it has to be contingent only.

14 Problem 14

- $\neg A \implies B$ - $\neg(A \implies \neg B)$ - $(A \implies B) \wedge (B \implies A)$

15 Problem 15

$$- \neg(\neg A \vee \neg B) - (\neg A \vee B) - (A \implies B) \wedge (B \implies A)$$