Assignment 3 Solutions

1

Dollar is strong - D, Yuan is strong - Y, New US-China trade agreement signed - T

a. $T \implies D \wedge Y$

b. $D \implies \neg Y$

c. $\neg D \implies \neg T$

d. $T \implies (\neg D \wedge Y) \vee (D \wedge \neg Y)$

e. $T \implies \neg D \wedge Y$

f. $T \implies Y \implies \neg D$

g. $T \implies Y \wedge D \implies \neg Y \wedge \neg D$

h. $T \implies (\neg D \wedge Y) \vee (D \wedge \neg Y)$

2

ϕ	$\neg\phi$	ψ	$\phi \implies \psi$	$\neg\phi \vee \psi$
T	F	T	T	T
T	F	F	F	F
F	T	T	T	T
F	T	F	T	T

3

The conclusion from the truth table above is that the conditional $\phi \implies \psi$ is equivalent to $\neg\phi \vee \psi$.

Example: Do not copy your homework, or you will fail. $\Leftrightarrow$ If you copy your homework, then you will fail.

4

ϕ	ψ	$\neg\psi$	$\phi \implies \psi$	$\phi \not\Rightarrow \psi$	$\phi \wedge \neg\psi$
T	T	F	T	F	F
T	F	T	F	T	T
F	T	F	T	F	F
F	F	T	T	F	F

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The conclusion from the truth table above is that the condtional $\phi \not\Rightarrow \psi$ is equivalent to $\phi \wedge \neg\psi$. Which also can be derived by using the DeMorgan law:

$\phi \implies \psi \Leftrightarrow \neg\phi \vee \psi$

$\phi \not\Rightarrow \psi \Leftrightarrow \neg(\phi \implies \psi) \Leftrightarrow \neg(\neg\phi \vee \psi) \Leftrightarrow \phi \wedge \neg\psi$